

INSIDE MAGIC MAN'S CLEVELAND WINNER!

Radio Control

47380



CAR ACTION

THE WORLD'S PREMIER R/C CAR MAGAZINE

June 1992

ASSOCIATED RC10 TEAM CAR

CAR OF THE YEAR

SCALE 1/10
MUGEN
SUPERSPORT

HOW
TO:

Mount Speed
Controllers



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KYOSHO
4RUNNER



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ON THE COVER: Car Action's 1992 Car of the Year—the Associated RC10 Team Car. (Photo by Steve Pond.) Upper right—Joel Johnson's Cleveland-winning 12L. (Photo by Yamil Sued.) Lower right—the Kyosho 4Runner. (Photo by John Huber.)

EDITORIAL

by FRANK MASI



THE FIRST TIME YOU "DID IT"

DO YOU remember your first R/C car experience? I remember mine. My father brought home a Tamiya Hornet and, at the time, it was the most high-tech thing I had ever seen. I spent countless hours bashing it around. I was amazed that this thing—this molded plastic/polycarbonate thing—could not only survive being driven at full speed into a curb, but it could

bounce up and over the curb, too! Regardless of what I did to that car, nothing on it ever broke.

Sometimes, we need to remember that the R/C hobby is supposed to be *fun*. If you're like me, you spend a lot of your time working on your cars. I usually race once a week, and I spend about 12 hours at the track—10 hours working on my cars and about 20 minutes actually driving it (counting practice). Can this burn you out? You bet your pinion gears it can.

Whenever I go on a photo shoot, I feel invigorated. Why? Because I can "bash" the cars around without having to worry about spring rates and shock bleeding. It reminds me that I often have more fun bopping around parking lots and backyards than I do at full-blown races. There are no killer batteries, no state-of-the-art tires—just a transmitter, a car and a few charged battery packs.

To get that ever-elusive "killer" photo during the Tamiya Nissan Skyline GT-R shoot, I tried to get the car to oversteer, but nothing worked. Eventually, I discovered that if I drove the car in fast and quickly flicked its wheel left and then right while tapping its brakes lightly then I could produce instant, awesome power slides! Later, I found a patch of ice and did some serious ice racing. Although the Skyline *still* wouldn't oversteer, it was *so cool*! I just aimed it in the desired direction and floored the throttle, and all four of its tires spun crazily, dragging it across the ice!

I'll never give up racing, but whenever I get burned out on it, I'll spend some "quality time" behind the transmitter. You should try it; you'll thank me later! (Oh, and by the way, Billy, sorry about that scratch on your Nissan.) ■

Frank Masi

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Publisher	DR. LOUIS V. DeFRANCESCO
Associate Publisher	YVONNE M. DeFRANCESCO
Executive Editor	FRANK R. MASI
Managing Editor	LI AGEN
Alleged Editor	CHRIS CHIANELLI
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LETTERS

ENGLISH LESSON

Your magazine is the best! Now, enough kissing up. On page 8 of your February '92 issue, there's a letter titled "Look It Up." Your answer to the first question was good, but the second answer had some flaws. I'm 13, too, and my English teacher doesn't talk about anything like "i.e." or "e.g." When you say "look it up," where do I do this. Also, what do "i.e." and "e.g." have to do with Latin. I've asked my parents and showed them examples, but they have no idea what these things mean. Please help.

K.P. HUNTER
Danville, CA

K.P., please send me your school's address. I need to have a word with the head of your English Department.

First, the words "English" and "Latin" are always capitalized (although you can use "english" if you're referring to putting a spin on a ball), and questions always end with a question mark! Second, it should already have been drilled into your head that whenever you come across a word or phrase that you don't understand, you should run—not walk—to your dictionary. Some dictionaries list abbreviations alphabetically in the main body of entries; some list them separately in an appendix.

As for the meanings: "i.e." is an abbreviation for the Latin phrase "id est," which means "that is"; "e.g." stands for "exempli gratia," which means "for example." For further elucidation, see Strunk and White's "The Elements of Style," or—if you're feeling really adventurous—consult "Fowler's Modern English Usage." If your English teacher doesn't own either of these books, I suggest that you transfer immediately.

One more thing, K.P.; there's no such thing as too much kissing up. LA

counters, computer programs, drivers'-stand specs, etc.

TODD ADAMS
Marysville, WA

Todd, one of our contributors is working on an article about track construction—watch for it in an upcoming issue. You should also check out "Race Management 101," in Radio Control Racer (November '91).

In the meantime, I suggest that you write to ROAR (288 E. Maple, Ste. 266, Birmingham, MI 48011) or NORRCA (331 Mariposa Ct., Upland, CA 91786) for their guidelines. Good luck with your endeavors! LA

KUDOS TO CAR ACTION

Wow! Someone showed me the article on the 1/8-Scale Nats in your April '92 issue. Nice job! Several years ago, I wrote off your magazine as a piece of neon fluff that had neither depth nor substance. My main interest is gas cars, which, at that time, received little or no coverage. (Even your articles on electric cars offered little of interest.) I was forced to read the somewhat biased articles published by your competitors.

Well, I've seen the light, and I've called your 800 number to order my subscription. I couldn't believe there was a regular column called "Nitro News" as well as feature articles on gas cars. It's an upbeat magazine without all the politics. Like I said—nice.

Finally, I'd like to commend Jeff Bronstein. He's one of the few writers who has a handle on gas cars and can write about them well. His clear, concise articles also have touches of humor. My hat's off to him and to your magazine.

BRENT GOTTFRIED
Toledo, OH

TRACK TALK

I want to build an indoor off-road track in my rainy state. I'd like to receive information on track size (length), lane width, lap

COMPETITIVE KITTYS

What's the difference between the Schumacher Cougar and the new Cougar II? Which is better for all-out racing, and

which has plenty of available hop-ups? Also, which is better for racing—the Cougar or the RC10 Team Car (aluminum)? Both are in the same ballpark as far as price is concerned.

DAVE POLKOSZEK
Des Plaines, IL

Dave, the differences between the Cougar and the Cougar II are substantial. The Cougar II features front and rear A-arms and hard-coated shocks as well as updated front and rear shock towers, a rear bulkhead, a slipper clutch, 2.2-inch rims, alloy drive shafts and a diff. In fact, all that remains of the original Cougar is the chassis, and even that has been modified. (It's now anodized red.)

The Cougar II and the Team Car are designed to do the same thing—win races. The driver would be the only deciding factor in a race between them. AS

PENALTY FOR CHARGING

I've been racing for about three years, and I need some information on chargers. My old, 15-minute, quick-charger broke down, and it will cost too much to repair it. I've been looking at Novak's new Digi-Peak chargers and Tekin's new 100L and BC210 Reflex chargers. I generally race in the stock class, so use 1200 and 1400 SCR batteries. Which charger would be best for me? Can I use an automotive battery charger as a power supply with any of these chargers? If I have to buy an automotive battery, how long will it last? What's the best amperage at which to charge SCRs? What effects will it have if I charge an SCR at a lower amperage than that suggested by the manufacturer? You can adjust the amperage of these chargers, so is it possible to use them to break-in motors? Will any of these chargers be affected by radio interference? *Your mag rules!*

STEVE LEONARD
Sarnia, Ontario, Canada

(Continued on page 42)

New In '92

RC-10 and RC-10T

2003 RC-10 Telescoping Drive System w/H-Arm for Stealth **64.95**

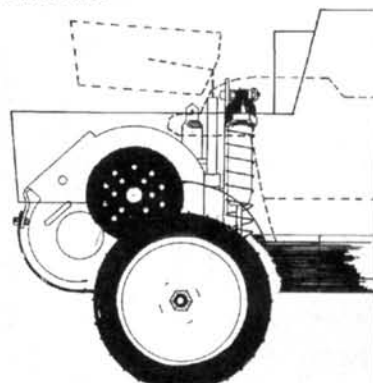
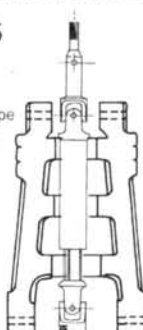
2005 RC-10T Telescoping Drive System w/H-Arm for Stealth **64.95**

2001 RC-10 Telescoping Drive System w/H-Arm for MIP & J Car **64.95**

2002 RC-10 Telescoping Drive System w/H-Arm for Trackmaster w/H-Arm **64.95**

2005

Prototype H-Arm



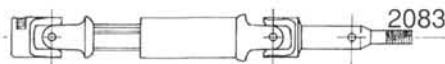
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2080 C/W & Titan Hard Anodized Shock Bodies (4) **24.95**

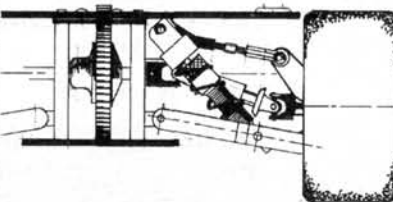
2081 C/W & Titan Aluminum Spring Retainer (1) **6.00**

2084 C/W & Titan Aluminum 'Double O' Rings (1) **5.95**



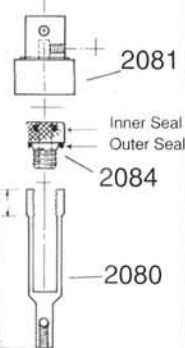
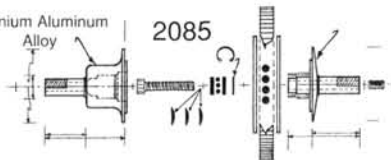
2083 C/W Intimidator Telescoping Drive System **54.95**

2085 C/W Intimidator Lite Weight ProBall Diff. **44.95**



Titanium Alloy

2085



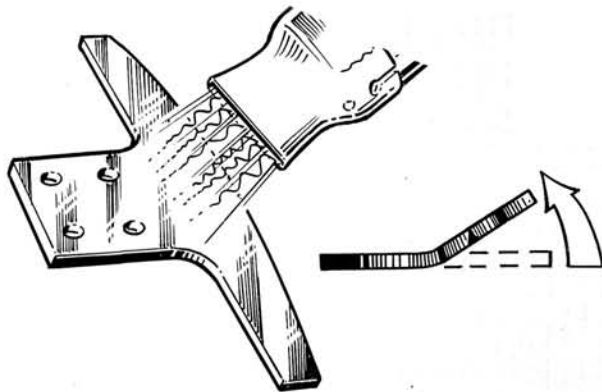
RC-10, JRX Pro, and Ultima Oval Chassis Available

Special Thanks to Rod Ward, Mike Bell and Team Riverside for support and R&D.

Raborn Racing Originals
6707 Chimney Rock
Bellaire, TX 77401
713-668-8866

PIT TIPS

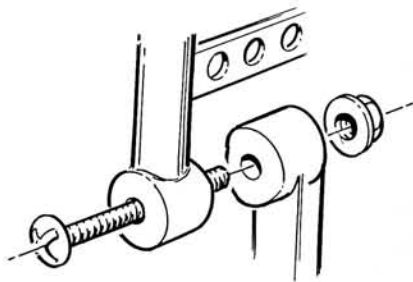
by JIM NEWMAN



JR-X2 BUMPER/SKID PLATE

To prevent the JG bumper on your JR-X2 from digging in during a nose dive, use a heat gun to soften the plastic and then bend it upward a few degrees. It will act as a skid plate and prevent a nose-first landing from bringing your car to a dead stop.

Philip Richard Sachs, West Hempstead, NY



BLACKFOOT BODY-MOUNT REPAIR

If you strip out the plastic threads on your car's body mount, here's a reliable way to repair them. Drill out the hole and screw a 3x20mm machine screw right through it; attach a 3mm flange nut to the end.

John Henry, Capac, MI



HOMEMADE ROLL CAGE

You can mount a coat-hanger roll cage in the holes that come already drilled in the FX-10 chassis. Make the cage large enough to protect the wing in a roll-over; it will even help the car flip upright. If you clean, bend and solder—even epoxy—the wires together where they intersect, the cage will be even stronger. This might work on other cars, too.

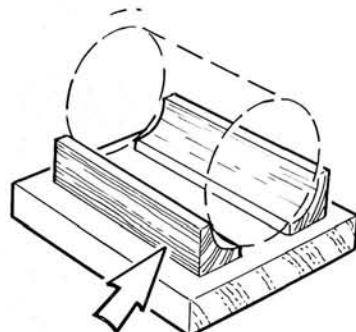
Steven Sanfratello, New York, NY



SMOOTHER DIFF RINGS

Stock diff rings are often punched out of steel plate, and they have rough, slightly cupped edges. To flatten and smooth them, lay a sheet of 240-grit wet-and-dry Carborundum paper on a flat surface, put a few drops of oil on the paper, then rub each diff ring around and around on it until its "working" side is flat and smooth. A knife-honing stone is also good for this. Be sure to wash the rings well in solvent to remove all the grit and oil.

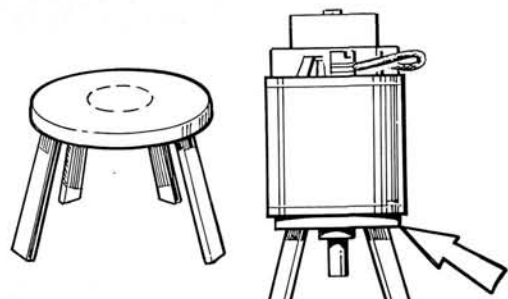
Jeff Pieper, Strasburg, IL



MOTOR BREAK-IN STAND

For a few cents, you can probably buy a short offcut of wooden cove molding from the lumberyard. Glue the pieces to a small board, drive a couple of small nails into the molding pieces, and hold the motor in your new break-in stand with a rubber band that's looped around the nails.

Neil Hicks, Sheboygan, MI



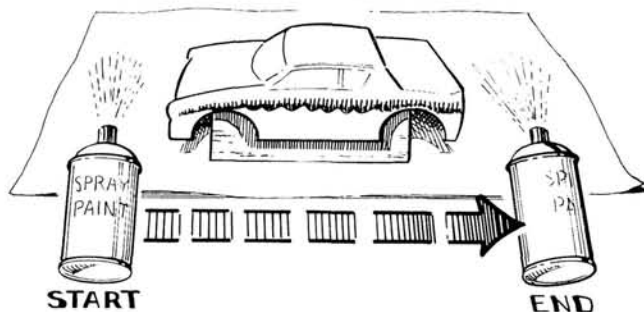
PLASTIC MOTOR STAND

When next you order a pizza, be sure to save the little plastic stool that keeps the lid off the cheese. Shorten the legs to about 1/2 inch, drill a suitable hole in the center to clear the motor shaft, and you have a motor servicing stand. If you put a few pieces of Blue Tack® on the "stool" it will hold the motor securely, yet release it cleanly when you want to remove it.

Jeff Milton, Memphis, TN

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

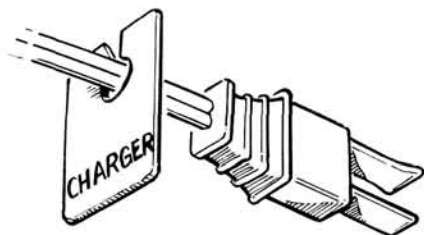
PIT TIPS



SPRAY WITHOUT SPLATTERS

When you press the button on a spray-point can, paint invariably splatters before it sprays smoothly. To ensure that the splatters don't end up on your car, set your car on a block that's on a large sheet of paper. Aim the can's nozzle in front of the car, press the button and then slowly spray along the car. With this technique, the splatters end up on the paper, not on the car.

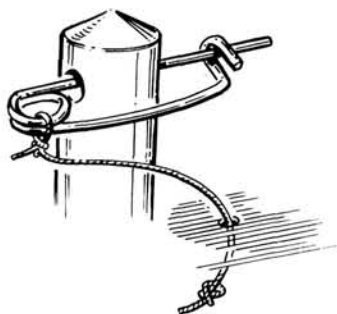
Anthony Pirchio, Sarasota, FL



ELECTRICAL LEAD MARKERS

If your workbench is a cluttered rat's nest of tangled leads, why not tab all the plugs with tape or bread-wrapper closures? You'll easily be able to identify the wire of any tool whenever you need to. Bread-wrapper closures come in many colors, so you could color-code plugs. You could also clean up your workbench!

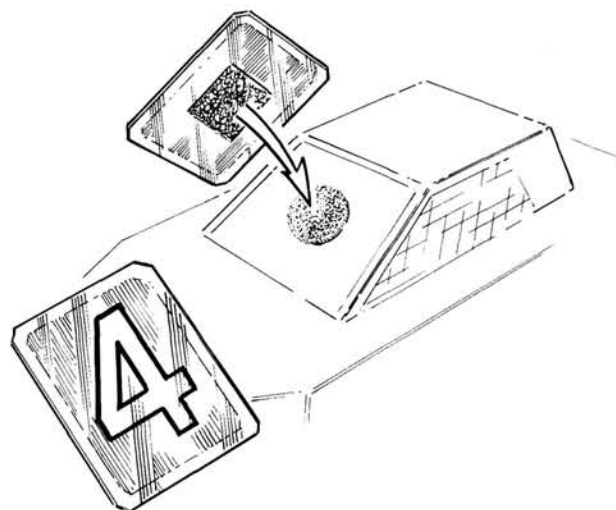
Jon Appleby, South Berwick, ME



SAFETY-PIN CLIP

Make inexpensive body clips out of safety pins. First cut off the point and the latch, then insert one end of the pin through the body post (see drawing). Loop a small rubber band around the open ends of the pin to secure it, or just bend one end of the pin so that it acts as a catch. Now tie a fine nylon string to the looped end of the pin, and thread the other end through a small hole drilled in the body. Knot the end of the string, and you'll never lose this body clip.

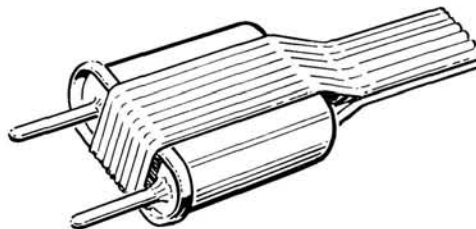
Ben Smith, Greenville, NC



QUICK-CHANGE NUMBERS

If you organize races and have a personal computer, you'll find this tip useful. Quickly make these inexpensive numbers by generating a computer print-out of them, cutting them out and pasting them onto pieces of brightly colored poster board. Outline them with a marker and cover each side of the board with the plastic laminating film that's available in small packs from the dime store. Stick Velcro® to the back of each and to the cars, and the numbers will be held firmly while the cars race.

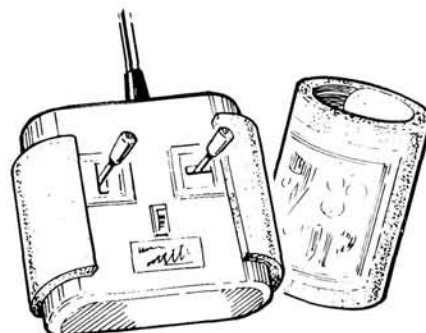
Thomas A. Oliva, Villa Park, IL



CRYSTAL PULL TAB

If the tab snaps off your radio crystal, make a robust replacement by cutting a strip of that filament-reinforced parcel strapping tape and wrapping it around the crystal, as shown. Make a tab that's long enough to grip easily.

Jon F. McGill, Tulare, CA



COZY-GRIP TRANSMITTER

Cut a sponge-rubber soda-bottle insulating sleeve into halves and attach it to your regular transmitter box or pistol-grip transmitter with a few smears of contact adhesive. Your transmitter will be more comfortable to grip—warmer in cold weather, and not as sweaty and slippery when it's hot.

Robert Garcia, Brownsville, TX

INSIDE SCOOP

by CHRIS CHIANELLI

HIGH-TECH BALANCING ACT

It didn't surprise me that one of the most high-tech items at the show was in the Graupner booth. The mechanical man's arms are hooked up to a much-guarded box on the back of the bike. The box obviously contains an all-new leveling/gyro system. The system is so sensitive that the man and the bike stay upright to almost a full stop! The connections between the box, the arms and the handlebars were amazingly smooth, resulting in almost instantaneous movement.



Well, here I am again, somewhere in Deutschland this time, giving a friendly wave from atop a Kirche (that's German for church), taking a quick Bavarian break—unknownst to the Ayatollah—during my covert vacation (code name: "blitzen-model-mission") at the Nuremberg



Hobby and Toy Show. I'm in trouble now! The great one warned me: "All breaks sind verboten!" Bin ich kaputt??



By October, Great Planes will offer Kyosho's Nitro Thrasher—a 4WD, glow-powered, 1/10-scale Ford truck. With the possible exception of wheels and tires, the Thrasher has nothing in common with the Nitro Brute. Its features include black Kelron shocks, an aluminum chassis and a CZR .12 pull-start engine. The graphics you see here will also come with the kit.

NITRO THRASHER

NEW SANYO CELLS



Trinity will soon stock the latest Sanyo 1700 SCR cells, which, of course, you'll be able to buy matched or Pushed. Watch for them!



I had the honor of meeting the president of the newly formed Tamiya America, Masayuki Tamiya, and Edward Frey, Executive Coordinator for U.S. R&D, who was extremely helpful. Mr. Frey showed

me the latest Tamiya products, including the 1/14-scale Tamtech F-1 line. The first cars scheduled to be produced are a Ferrari 643 and Lotus 102B. They run on either alkaline dry cells or Tamtech 7.2V



packs. The photo above was taken by Mr. Frey.

1/14 TAMTECH

KING-SIZE



KYOSHOS

Don't count on finding them in the USA just yet, but these 1/5-scale offerings mark Kyosho's entry into giant-scale car production. Pictured here is the Lancia Delta Integrale 16V with a pull-start 22cc gas ignition engine. Also at the show (but not pictured here)



was an off-road buggy that has the same chassis. If these cars *are* ever introduced in the U.S., the buggy will probably lead the way.



HIGH TENSION TORQUE?

The Powerline Motor series is new from Duratrax, and according to Mike Shaw at Great Planes, these motors offer excellent value. Aimed at all aspects of racing, all Powerline Motors feature 4.9mm wet magnets; a 1.3mm can; a heat-sink endbell; precision, machine-wound, balanced and epoxied armatures; high-silver-content brushes; and diamond-trued commutators. All have adjustable timing. We'll see how they fare at the track, won't we?

UNKNOWN BUGGY

This yet-to-be-named, 1/10-scale, almost-ready-to-run 2WD buggy, which will be imported at some time in the future by Altech Marketing, has many interesting features. Besides being easy to convert to 4WD, this car has a disk brake, a quick-fill tank, anodized-aluminum shocks, an aluminum pan chassis and a pull-start .12 glow engine. The car will be available initially with a racing pickup truck body; a buggy body will follow. The vivacious model is Switzerland's own Judith Barmet. Isn't traveling great?



ROBBE KENWORTH



The Kenworth W 900 is Robbe's newest 18-wheeler. Like the Peterbilt, it features a one-piece aluminum chassis (all holes factory-drilled), a fully enclosed beveled-gear transmission, a leaf-spring suspension, scale-profile air-filled tires and many chrome fittings, e.g., a radiator, exhaust, horns, lamps and mirrors. A towing kit and scale engine options are also available.

INSIDE SCOOP

In addition to having a very comfortable, contoured transmitter with an "ultra" matte, no-slip finish, the new Hobby Shack Cirrus Elite GR2 is built by industrial robots using state-of-the-art surface-mounting technology. The Cirrus Elite GR2 features servo-reversing and three-position throttle kick-down.

COMFORT ZONE



ALL TERRAIN TERROR

TRI (Thaural Research Inc.) of Quebec claims, "You've never seen a monster truck like it." They're talking about their new Grizzly, an "extra-heavy-duty," 1/8-scale, fully assembled 4WD monster truck. The fully independent suspension features an exceptional 2 3/8 inches of travel at each wheel and super-giant 7-inch tires. According to TRI, the heavy-duty transmission and motor give the Grizzly amazing pulling power, and every component, including the T6 aluminum chassis, is designed to take abuse. The Grizzly has so many features that I can't mention them all here, but if you want more info, write to Thaural Research Inc., 5585 Verdi Brossard, Quebec J4W 1B4, or call (514) 672-5697.

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The result is the lowest cost, highest quality sport pack available.

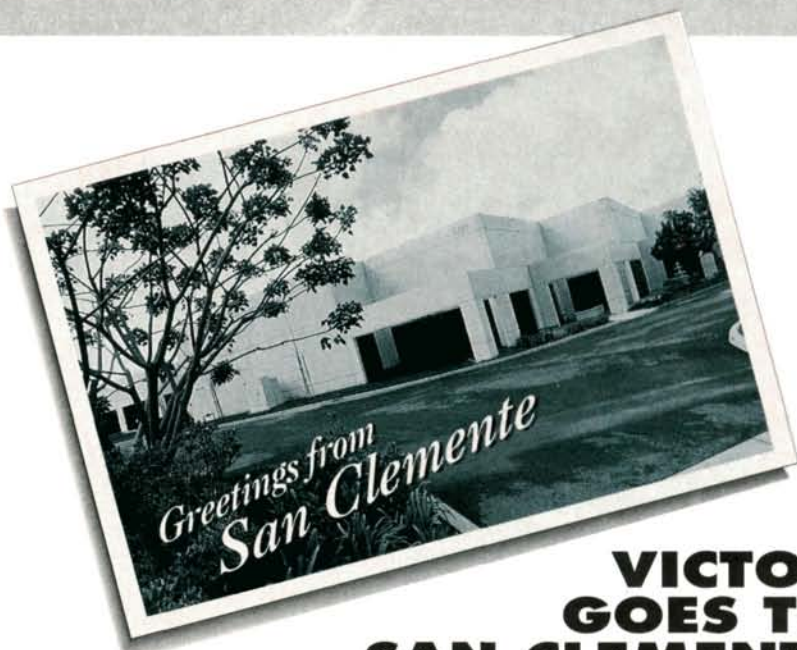
Buy several as back-up spares. Never be short of power.

TRINITY

Trinity Products Inc

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VICTOR GOES TO SAN CLEMENTE

Victor Engineering, known for its unique, high-quality electronic products, is moving to new headquarters in San Clemente, CA. Victor Engineering's CEO Vic Kmosek states, "In order to keep pace with our distribution growth and success, we felt the move to larger facilities necessary." As of April 1, the new address will be 380 Camino de Estrella, Suite 170, San Clemente, CA 92672; phone (714) 496-9701; fax (714) 496-0608.

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Trinity's Championship series of motors is well named. The 1991 record books clearly show the Championship Series has been the hands down winner in all types of modified racing.

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Championship motors are fast and are the first specifically designed to use Sanyo's new 1700SCRC and Panasonic's P170 SCR batteries.



RC1700	Nuclear Meltdown™	(9T, Dbl)	\$80
RC1777	Kevin, Kevin™	(10T, Trpl)	\$80
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RC1779	Speed Metal™	(12T, Trpl)	\$80
RC1780	Flash Point™	(13T, Sngl)	\$80
RC1781	Buzz Saw™	(14T, Dbl)	\$80
RC1782	Armageddon™	(15T, Quad)	\$80
RC1783	The Classic™	(16T, Quint)	\$80
RC1708	Joel Magic Johnson®	(17T, Trpl)	\$80

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READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1992. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



■ 'SNO PROBLEM

What do you do when you have an extra channel on your radio, a spare servo and a thin sheet of aluminum? Well, if you're Steven Devost of Terrace, British Columbia, Canada, you make a snowplow for your Sledgehammer. He uses the third channel on his Futaba Magnum PCM to raise and lower the plow. The combination of a Novak 610-RV and a Trinity Triad motor was so powerful that Steven had to make a wheelie bar to keep the 'hammer under control.



■ HOLY IGNITION, BATMAN!

Dan Baraszu of Plymouth, MI, scratch-built this rocket-powered Batmobile. Its chassis is made of printed-circuit board, and its front wheels are controlled by an old transmitter with only one functional channel. It's powered by a C6-3 engine and incorporates a model rocket that was cut into two pieces; a parachute comes out of its nose cone. (Kids, don't try this at home!) "Batman Dan" says he's preparing his creation for time trials—we hope he'll keep us posted.

■ TANKS FOR THE MEMORIES

When Ron Grobelny of Roseville, MI, decided to convert his Kyosho Heavy Metal into the "Bigfoot Fastrax," tank he didn't realize it would take a month's worth of hard labor. The result, however, was worth the effort! He trimmed the front of the tank to fit a Parma Bigfoot Shuttle Aerostar body. He custom-made the front end and the interior of aluminum and plastic sheets and plastic tubing, and he did the lettering and striping himself using Pactra trim tape. The tank has a tilt body, a fully detailed interior, a roll cage, a driver and two Parma Hemi engines—all controlled by a Futaba Attack (how appropriate!).





■ DIAL 911

Dick Bipes of Rochester, MN, submitted a photo of his RC10T for the Ayatollah of Radio Controlla's approval. Dick uses a Futaba Magnum Jr., a Tekin 410S ESC and a Dr. Von Quick Pocket Rocket motor "to overtake and apprehend" the bad guys at his track. He installed flashing lights in the light bar, which was made of scrap Lexan and attached using servo tape. The lights draw very little current, so he can have fun *and* remain competitive.

■ I WANT MY MTV

The nifty paint job and MTV decals on this TRC Lynx II Elite caught the Ayatollah's eye. Jono Pandolfiof Briarcliff, NY, uses Trinity's Pushed Sanyos and King Kong motor to power the car and a Novak 410 M1c and a Futaba Magnum radio to control it. He says that it runs like magic with a Paragon Turbo Pack. An Andy's Lumina body and Parma and Autographics decals really finish it off.



■ NIGHTSTALKER

Jeff Smith of Oregon City, OR, created the Nightstalker by chopping $7/8$ -inch out of the center of an MRP Van/Am GT body. It has two fully detailed Parma Hemis, a home-made roll bar and a driver's cockpit. Powered by Trinity Monster Mash motors and 14 cells and controlled by a Tekin 700 ESC, this vehicle stalks with Custom Chrome Products (CCP) steel gears,

a bearing kit, Tecnacraft wheels and stock tires. (To enable the vehicle to make high-speed turns without rolling, Jeff locked down the rear wheels.) Other extras include CCP ladder bars, suspension braces and rod ends; eight Trinity Clod oil-filled shocks on homemade shock mounts; and a homemade brush guard up front.

Support Your Local Hobby Shop!

HOT GRAPHICS

INSIDE APPLICATION
FOR CLEAR BODIES



Inside Stick HOT NUMBERS



Duane Abrego, (R) Thunderdrome concours winner, is congratulated by Eagle's Gino Filippi.

Customizing your R/C has never been easier... it's as simple as CUT, PEEL and STICK. Eagle Products combines hot graphics, state of the art materials and the ease of peel and stick application to give your machine the look that sets you apart. So whether it's asphalt, dirt, water or air, get there faster than anyone else with

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TROUBLESHOOTING

by FRANK MASI

Illustrations by GERRY YARRISH



OVERPOWERING MOTOR

My new Traxxas Hawk is mostly stock, but I've added a Novak 410-M5 ESC. In your December '91 issue, a reader wrote that he wanted to put a Triad 9-turn 50,000rpm motor in his Junior T, but you said the truck would be almost "undriveable," and giving it any throttle would break its rear end loose. I was planning to buy the same motor, but then I began to wonder if the same thing would happen to me.

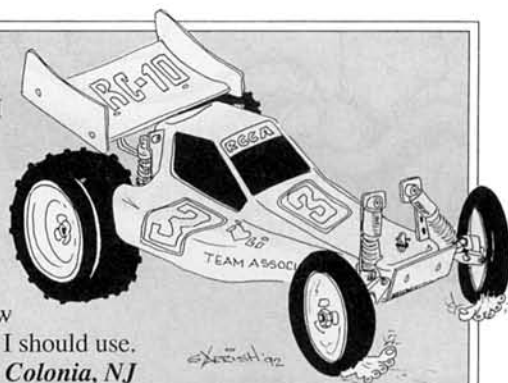
Dale Panetti, Pittsfield, MA

I'd have to recommend that you use a motor with a different wind. Rpm looks good on paper, but quick acceleration is more important. Using a 9-turn motor in a truck is overkill, and its life expectancy is short. For example, an off-road car with a stock motor may move 10 feet per second, but a truck with the same motor (using the same gear and the same transmission ratio) may move 15 feet per second. In the car, the motor is geared correctly; in the truck, it's over-geared, so it will run hotter for less time. This is why trucks require much lower gear ratios than cars that use comparable motors. You can achieve as much speed from a motor with fewer rpm, i.e., more turns, as you can using a 9-turn motor that's geared correctly. For trucks, stick with motors in the 14- to 18-turn range. They provide plenty of speed and rapid acceleration.

TOE-IN PANIC

When I built my RC10 Team Car, I noticed that the rear wheels pointed inward slightly. Some of my friends who have this car say that they have the same problem. I've also noticed that if I run my car through more than three battery charges, the connectors melt together. I'd like to know if there's a special kind of connector I should use.

John Madej, Colonia, NJ



Don't panic, John, the rear wheels on your RC10 are supposed to point inward. It's called "toe-in," and it keeps the rear tires tracking straight when the car accelerates. The Team Car is designed to have exactly 3 degrees of rear toe-in (1 1/2 degrees from the rear arm mounts; the rest from the rear hub carriers). The more toe-in a car has, the more stable it will be under acceleration. Too much toe-in, however, will reduce top speed slightly and cause it to understeer entering the turns.

Something's amiss—your connectors shouldn't be melting. Replace them with high-quality, low-resistance connectors such as those offered by Litespeed, Sermos, Race Prep, Trinity, or Deans.

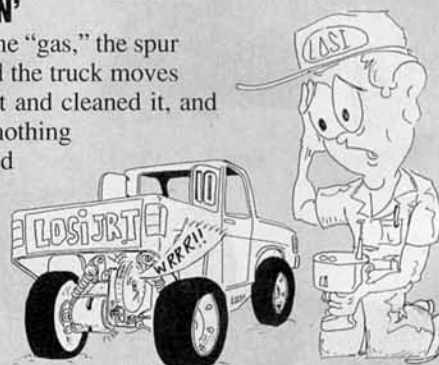
SPUR SLIPPIN'

Whenever I give my Losi Junior T some "gas," the spur gear spins freely and then catches, and the truck moves really slowly. I've taken the diff apart and cleaned it, and I've tightened it as much as I can, but nothing works. I have a Futaba MC112B speed controller, a 6-cell stick pack and a Kyosho stock motor.

Travis Ellington, Lexington, OH

Although you seem positive that the diff isn't slipping, check it again. There are, however, three other possibilities:

- The pin that holds the top transmission gear to the output shaft is damaged or missing. Without it, the gear will spin on the shaft, and it won't transfer power from the motor to the wheels.
- One (or both) of the transmission's outdrives (the molded, U-shaped parts that are attached to the tranny output gear with a 4-40 screw) isn't attached correctly to the output gear. To solve this, disassemble the drive shafts, remove the outdrives from the transmission and then carefully reinstall them. The outdrive and the output gear are designed to mesh; if they don't, the outdrive won't receive power from the motor to drive the wheels.
- You didn't glue the tires to the rims, so the rims simply spin inside them when throttle is applied. If this is the case, secure them to the rims with CA.



If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.

BOILING POINT

I own a mostly stock RC10. Can all of its nylon parts handle a boiling dye? Can the Novak 410-M5 handle a Reedy Mr. A? If not, what's the best motor for it? I want to buy an ESC, but there are so many. Can you recommend one?

Brian Szontagh, Raleigh, NC

Nylon parts, such as those in your RC10's suspension and chassis, actually benefit from being boiled. Untreated nylon gradually absorbs moisture from the air. This eventually makes the nylon more flexible and, therefore, more crash-resistant. Boiling the nylon part expedites and enhances this process. The boiling water causes the molecules in the nylon to expand and allows the water molecules to penetrate further into the nylon at a faster rate. When the part cools, the molecules contract and trap the water inside the nylon, making the part more flexible and thus more resistant to breakage. (Add a little salt to the water when you boil it to raise the temperature at which the water boils.)

A Novak M-5 is essentially a 410-M1c without the torque-limiting feature, and it has four strands of smaller-gauge wire instead of three large strands. Its internal construction is similar to that of the M1c, so it can handle all modifieds, and it operates on four to 10 cells.



DIRTY DEALINGS

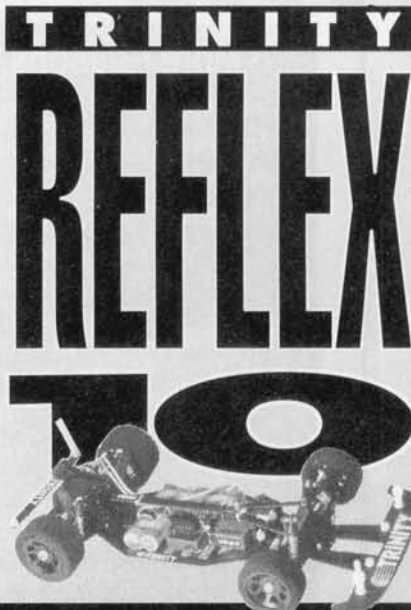
I've owned an RC10 since Christmas. It ran perfectly until a couple of days ago, when it started going slowly and making grinding noises. I ran it in the dirt, but I cleaned it.

Jason Anderson, Wilton, CT

The change in your car's performance is probably the result of a lack of proper maintenance. I'm sure you were excited about receiving an RC10 for Christmas, and you perhaps ran it and ran it, but that can take its toll on the car's drive train and suspension. It's fine to run your car in the dirt, but avoid sand and fine dirt, which can penetrate the ball bearing seals and enter the transmission. This is probably the cause of the grinding noise you hear. Remove the plastic cover that protects the pinion and spur gears (and the differential, if your car has the original RC10 tranny) and check the gears' condition. Remove large debris with a small screwdriver or an X-Acto knife. If the gears are beyond repair, replace them. Remove the motor from the car after you've run through two or three battery packs, and spray it thoroughly with motor spray. (Be careful not to get any on your skin.) Before you reinstall it, lubricate the motor bushings or bearings with a drop of light oil. Also, replace the motor brushes after you've used about 12 battery packs.



COMING NEXT MONTH!



FEATURES

Home-Built Nightstalker!
Install Radio Gear, Part III
Pit Gear: Tiny R/C car

R/C RACER

Florida Winter Champs
Build a Tire Truer—Cheap!
Speed Shop
Hot Tracks

TRACK REPORTS

Kyosho Chevy Sport Truck
Kyosho Raider Pro
Bolink Eliminator LTO-QC

COLUMNS

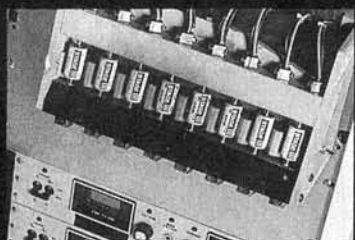
Nitro News
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Troubleshooting

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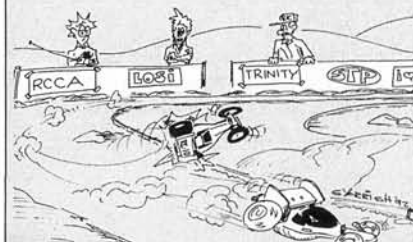
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CENTER-PUNCHED

I don't know a lot about R/C cars. (Actually, I just got into racing.) I assembled an RC10 graphite kit, but now I'm having a problem. After I turn the wheels one way, they come back to the center; after turning them the *other* way, they won't come back (or they'll come back partially, but not all the way). I've tried moving the servo arm and even putting on a servo-saver, but neither worked. I use a Futaba FP-S148 servo. I don't know what to do. Please help.

Brad Linard, Shipp, PA

Check that your steering servo is working correctly. Move the servo arm back and forth; any play indicates worn or broken gears. Futaba offers replacement gear sets, and most hobby shops stock sets for popular servos. If you can't find anything wrong with the servo, examine the steering linkage, which consists of the bellcranks and the steering rods. Disconnect it from the servo. Extend the suspension arms fully, and work the steering manually. It should operate smoothly and easily. If it binds, the servo won't return to center. To determine where the binding is occurring, raise the suspension arms until they're level with the chassis, and work the steering. If the binding has stopped, the problem is in the ball cups, which you should then replace. If the problem still exists, check the bellcranks. The nylon nuts that secure them to the steering posts are probably just too tight. If so, unscrew the nuts gradually until the binding disappears.

NEW!

DO YOU HAVE THE NEED FOR SPEED??

Have Fun by increasing the Power on your RC10!
Send for instructions and "KEY" Aluminum Motor Mount that will allow you to mount **TWO MOTORS** to your RC10 Transmission. The Dual Power Kit can also work with on-road and truck conversions. Experiment with gear ratios, add cells, switch tires or whatever it takes to cure your need for speed!

Specify Stock or Stealth Tranny;
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4runner

KYOSHO

by JOHN HUBER

IF REALISM IS your thing, check out the new Kyosho* 4Runner! With a suspension system designed after its full-size counterpart, and a scale body to go with it, the 4Runner is truly in a class of its own. It isn't a racing truck or a monster truck; I'd call it a recreational R/C truck that faithfully duplicates the style and performance of the real 4Runner.

In some ways, the 4Runner reminds me of Tamiya's classic Bruiser (it has many of the same scale compo-



PHOTOS BY JOHN HUBER

nents), but the 4Runner has several advantages: it's made of tough plastic and composite materials that are lighter than the Bruiser's steel and aluminum parts, and it doesn't have the Bruiser's complicated, heavy transmission. In short, the 4Runner is very realistic and performs better than the Bruiser does.

TUNDRA

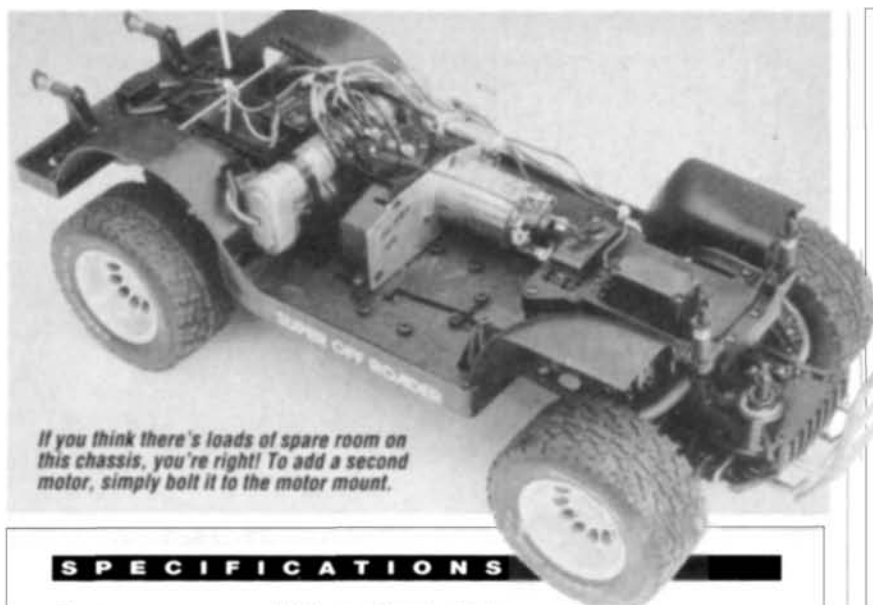


CONSTRUCTION

I was eager to build this truck as soon as the kit came into the office. When I got it home, I pulled out all the parts to get a better look at what lay ahead, and I read the instruction

manual and realized that the truck would be easier to build than I had expected. After a couple of late nights, I was using it to chase my cat through the living room.

TAMER



If you think there's loads of spare room on this chassis, you're right! To add a second motor, simply bolt it to the motor mount.

SPECIFICATIONS

Type 4WD recreational vehicle
Scale 1/9
Price \$299.99

DIMENSIONS:

Overall Length 20.5 inches
Width 9 inches
Wheelbase 11.5 inches
Track (l/r) 6.9 inches

WEIGHT:

Gross (with battery) 5 pounds,
15.58 ounces

BODY:

Type Toyota 4Runner
Material Polycarbonate/ABS

CHASSIS:

Type Tub
Material ABS resin

DRIVE TRAIN:

Primary Pinion/spur
Transmission Belt
Differentials Gear
Bearings/Bushings Bushings

SUSPENSION:

Front: Type Double wishbone
Damping none
Rear: Type 4-link with panhard rod
Damping none

WHEELS:

Type (l/r) One-piece chromed plastic
Dimensions (DxW) 2.1 x 1.6 inches

TIRES:

Front/Rear Bridgestone Desert Duelers

ELECTRICS:

Motor Mega 360 truck
Battery not included
Speed Controller 3-step with reverse

OPTIONS AS TESTED:

Futaba FM Magnum FP-T2PDF radio system with two S132SH servos. I made the first run with the stock motor and speed controller, but switched to Parma's Torque Master motor and Tekin's 411P ESC for further testing.

COMMENTS:

Building the 4Runner was as I expected—easy.



Kyosho's instructions guided me through assembly. A few bearings are included with the kit, but for best performance, replace them with ball bearings. The truck's handling was strikingly similar to that of a real 4Runner. Power from the stock motor was good, and run times were about 10 minutes. For *real* power, however, the Parma Torque Master motor is tough to beat. Don't expect the 4Runner to handle like a racing truck, because it won't; but if you want the most realistic looking and handling truck out there, it's just the thing.

KYOSHO 4RUNNER

I did, however, encounter a problem. After I assembled the front gear case, I found that it was difficult to fit the hinge pins into their mounts, and this caused a good amount of binding in the front suspension. To remedy this, I carefully enlarged the holes with a needle file.

Bearings are only included for the center differential. This keeps the kit's price down, but I recommend that you replace some of the bushings with bearings. The good news is that most of them are the common 5x10 size; the bad news is that there are 14 of them. You don't have to replace all of them, unless you plan to install a pair of hot modifieds, but I'd at least put them in the front wheels and the rear axle. The front and rear differentials are supported by larger (8x14) bushings that you can replace with the bearings that are used in Lazer and Triumph diffs.

RADICAL RADIO

The new Futaba* FM Magnum radio system comes with two S132SH servos. When I installed this system in the 4Runner, I used one for the throttle, but I used an S148 for steering. I didn't need the lightning-fast steering control that the S132 provides, and the S148 is more powerful.

"I'VE DRIVEN HUNDREDS OF DIFFERENT CARS OVER THE YEARS, BUT FEW HAVE BEEN AS REALISTIC AS THIS ONE IS."

Futaba developed a new receiver for this system—the FP-R103F. It's a three-channel, narrow-band micro receiver that fits in the same case as Futaba's FP-R113IP PCM receiver. The 103F should be very popular with PCM radio owners who want a good, relatively inexpensive second receiver.

MEAN GREEN

The 4Runner's molded Lexan body is truly beautiful. I painted it with metallic green automotive touch-up paint, but here's where I goofed: I didn't clean the surface thoroughly before I painted it, and this later caused the paint to peel. So, remember the Professor of Polycarbonate's number one rule: *always* wash the body out with soapy water. For even better adhesion, scuff the surface with sandpaper before you paint it. (Remember, the shine is on the outside.)

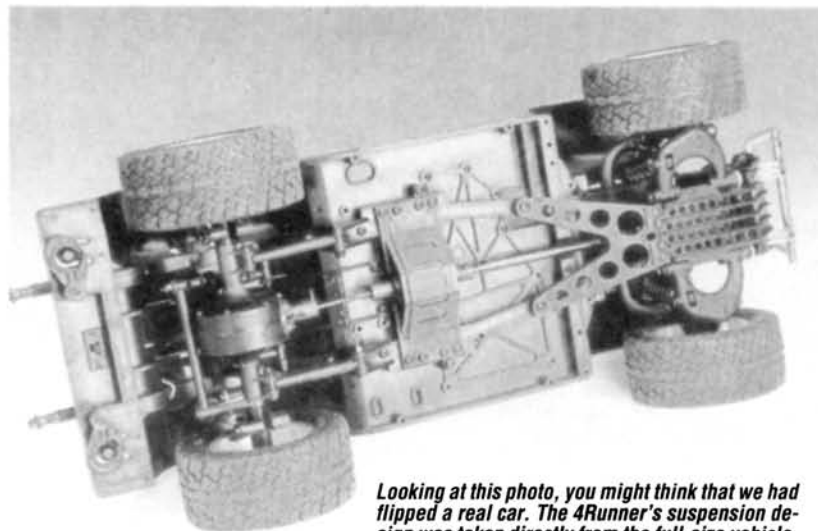
KYOSHO 4RUNNER

The body looked great with the bumper, grill, mirrors and wipers in place. I also discovered that standard Kyosho lights fit right into the sockets in the grill. The lights are powered by two AA batteries that I taped to the underside of the hood. Now it looks even more realistic!

4TUNDRARUNNER

I was thoroughly excited about the 4Runner's test run. Sure, I've driven hundreds of different cars over the years, but few have been as realistic as this one is. There was a light layer of snow on the ground at the construction site where I took these photos. The 4Runner had no trouble digging through the ice and dirt with the stock motor, but there was a slight amount of "lag" from the mechanical speed controller. I was glad that the unit had reverse, because the truck got stuck a few times.

On pavement, the truck was fast, yet easy to control. The tires gripped the wet pavement surprisingly well and they allowed rapid acceleration, but they tended to slide when I drove the truck into corners at full speed. Be careful on dry pavement! The truck's high center of gravity combined with the traction on



Looking at this photo, you might think that we had flipped a real car. The 4Runner's suspension design was taken directly from the full-size vehicle.

Parma* Torque Master motor into the truck to see what it could take. The Torque Master is a cobalt magnet, 13-turn triple-wind motor that has *lots* of power. For a moment, I actually considered putting two of those suckers in there, but I wanted to retain *some* run time. The Parma motor draws more current, so I replaced the stock speed controller with a Tekin* 411P. This ESC helped me to regulate the truck's speed, but I lost the luxury of reverse.

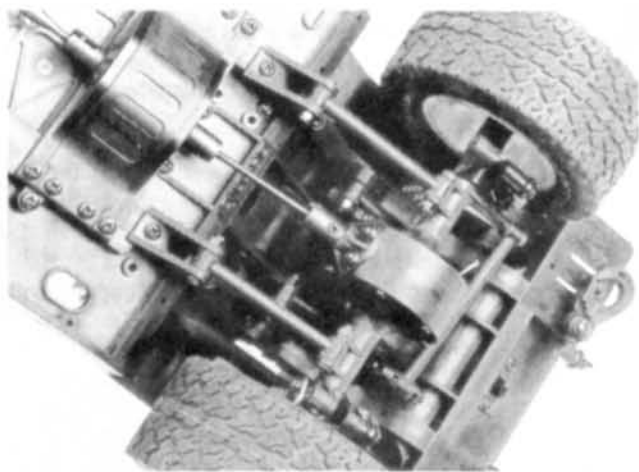
Then, I headed to a baseball diamond near my home. It was still very cold, and

cloud of dust. The tires don't provide the traction you'd get from spiked off-road tires, but they do exactly what they were intended to do: they perform like the full-size ones!

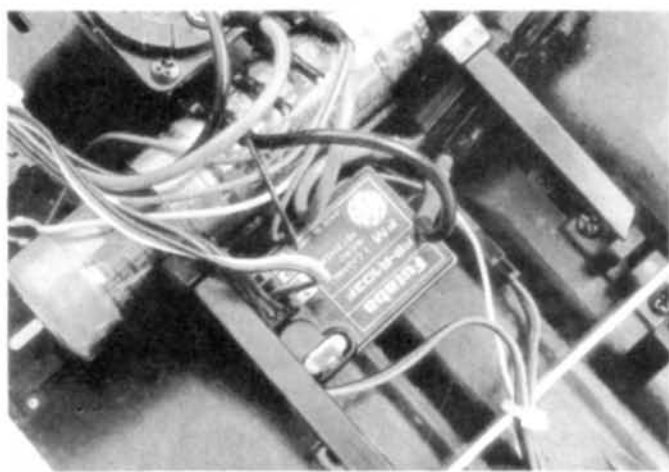
Kyosho has taken a giant step forward with the 4Runner. Its designers sat down to produce a model of the 4Runner that was as scale as possible, and that's exactly what they came up with! Let's hope that the gas version is soon to follow!

**Here are the addresses of the companies mentioned in this article:*

Kyosho/Great Planes Model Distributors, P.O.



Power from the center differential is routed to the front and rear with dogbones. The center diff is underneath the chassis and is connected to the motor with a belt.



Futaba's new FM receiver is the same size as its PCM receiver. To use the FM receiver with the PCM transmitter, just switch the transmitter to the PPM mode.

dry pavement make rollovers likely. (Even full-size 4WD recreational vehicles provide warnings about handling.) After this run, I was ready for some *real* power.

I headed back to my shop and put a

the rock-solid ground was coated with fine, powdery dirt that provided some spectacular sideways slides. Boy, did the truck take off! In fact, the motor's torque caused the body to lean under acceleration. It headed across the diamond in a

Box 9021, Champaign, IL 61826.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Parma International Inc., 13927 Progress Pkwy., North Royalton, OH 44133.

Tekin Electronics, 970 Negocio, San Clemente, CA 92672. ■

TRUCK STOP

by DAVE SPROUL

Diet donuts!



Tires (left to right): Clod Buster, USA-1 Electric, USA-1 Nitro Crusher. They're all the same size and they have similar treads, but the Nitro tire is lightest and strongest.

THIS MONTH, WE'LL deal with a subject that most monster truckers don't think about—reducing truck weight. Most of us add every conceivable trick-looking, aluminum this-or-that, and that's OK—if you don't race your truck. The popularity of monster-truck obstacle-course racing is growing, however, so you may want to prepare your monster truck for competition rather than for looks.

You know that you can increase performance with hop-up items, e.g., hot motors, electronic speed controllers and suspension kits, but another way to improve performance and handling is to reduce weight. It's simple: a lighter truck accelerates, jumps and corners better than a heavier one does.

Remove all unnecessary "look-good" items, such as chrome bumpers and roll bars. Aluminum add-ons are

especially heavy, so those trick bumpers and wheels will have to go. (Put them on your show truck when you're not racing it.) Determine which parts you can remove without sacrificing strength or performance, and get rid of them.



Sassy Chassis' new radius rod/traction bar kit can strengthen your USA-1's suspension arms, and improve its handling and durability.

Those huge monster-truck tires are a major source of weight, but there's nothing you can do about that, right? Wrong! I've done a little research, and I came up with some surprising information. Check out the weights of these tires in the chart. Although the USA-1 tires appear to be

identical, the Nitro tire is lighter owing to its rubber compound. If you replace your Clod Buster tires with Imex Road Dawgs, you can shed 3.5 ounces per tire—a total of 14 ounces! Shaving off all but 1/16 inch of the Imex tire's tread saves another 1.5 ounces per tire.

Shaving a tire's tread lightens it, lowers its profile and improves its cornering ability. The down side, however, is that it may soften the tire to the point that you need foam inserts. I run USA-1 Nitro Crusher tires with shaved treads and CRP* inserts on my modified electric USA-1 truck. I also have a set of shaved Imex Road Dawgs. Both setups work very well, and the shaved treads haven't reduced my truck's traction.

I hope that this has been enlightening (pardon the pun) to those of you who are interested in racing your Clod Busters, Bullheads or USA-1s. Remember—lighter equals faster.

PRODUCT NEWS

Sassy Chassis* now offers a radius rod/traction bar kit for Kyosho's USA-1 that eliminates suspension-arm flex and twist under acceleration. Contact Sassy Chassis for more information, and be sure to tell them that you saw it in *R/C Car Action*. See you next time!

**Here are the addresses of the companies mentioned in this article:*

MRC/Tamiya, 200 Carter Dr., Edison, NJ 08817.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826.

Imex Model Co. Inc., 2201 E. 5th Ave., Ronkonkoma, NY 11779.

Twinn-K Inc., 4770 W. 139th St., Cleveland, OH 44135.

Custom Racing Products, 8784 Plata Ln., Atascadero, CA 93422.

Sassy Chassis, 906 Ridgewood Dr., Cary, IL 60013. ■



You can shave the Imex Road Dawg tire treads without losing side-wall stiffness.

Tamiya* Clod Buster/Bullhead	11.0 ounces
Kyosho* USA-1 Electric	10.5 ounces
Kyosho USA-1 Nitro Crusher	9.0 ounces
Imex* Road Dawg	7.5 ounces
Twinn-K* Foams	7.5 ounces



PHOTOS BY JOHN HUBERT

IF YOU'RE A SERIOUS R/CER, THEN YOU'VE PROBABLY CONSIDERED TRYING $1/8$ -SCALE GAS CARS, BUT PERHAPS THE INITIAL EXPENSE OR THE RUMOR THAT GAS ENGINES ARE FINICKY AND UNRELIABLE HAS PREVENTED YOU FROM TAKING THE NITRO PLUNGE. GAS-CARS DO COST MORE THAN ELECTRICS BUT, AFTER THE INITIAL INVESTMENT, IT'S RELATIVELY INEXPENSIVE TO RUN AND MAINTAIN THEM. IN ADDITION, TODAY'S GAS ENGINES ARE VERY RELIABLE, AND THE CARS ARE DURABLE AND WELL-ENGINEERED. IN EUROPE AND JAPAN, THE POPULARITY OF ON- AND OFF-ROAD $1/8$ -SCALE GAS RACING RIVALS THAT OF $1/10$ -SCALE ELECTRIC RACING IN THE U.S.

a - m o v i n '

a n d

a - s h a k i n '



■ ■ ■ TRACK REPORT ■ ■ ■



by FRANK MASI

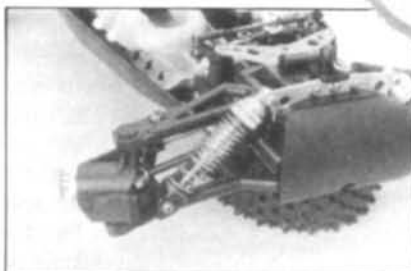
Mugen Super Sport

Mugen Super Sport

As an avid R/C off-road racer, I naturally wanted to try an 1/8-scale gas off-road car. There were several models from which to choose, but when the Mugen* Super Sport arrived at the *Car Action* office, I knew it was the nitro-burner for me!

DA CHASSIS

Although the Super Sport's thick aluminum-plate chassis is very rigid, it's also heavy. Mugen offers a light, "finned," aluminum chassis, but I used one of the trick graphite/aluminum composite chassis that DA Graphite's* Dave Inkel makes for Japanese Super Sport owners. It weighs about half as much as the stock one, yet it seems just as rigid. Its top is made of aluminum, so it doubles as a heat sink for the engine. Further, the chassis accommodates the Super Sport's molded-nylon dirt shields.



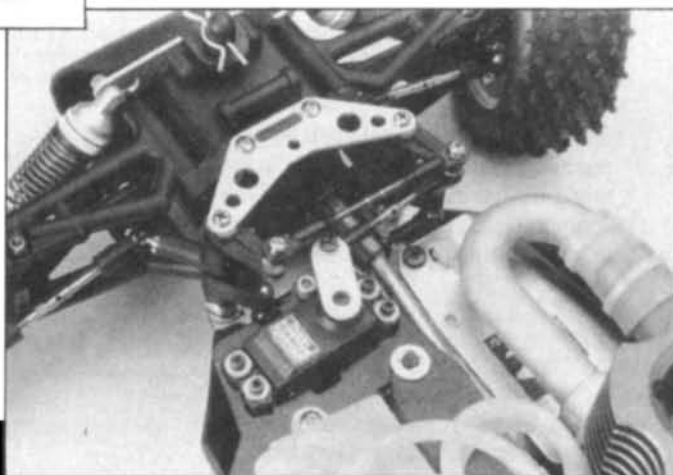
▲ The Super Sport has heavy-duty upper and lower A-arms, adjustable camber and caster and large oil-filled, coil-over shocks. A hefty front bumper protects the suspension components.

► One-eighth-scale off-road cars need strong, powerful steering servos such as Futaba S9302s. To prevent the servo from being damaged during collisions, the Super Sport has dual servo-savers.

mount in front of the rear gearbox. It transfers the engine's power to the front and rear diffs—favoring whichever end of the car has more traction—and its steel spur gear is bolted securely to its aluminum housing. A hefty dogbone-type drive shaft connects this diff to the front gearbox. Power reaches the wheels by means of conventional dogbones in the rear and unique, two-piece, universal-joint drive shafts up front. Electric cars rely on their motors to provide braking action, but gas cars need fairly sophisticated disk-brake systems. You mount the Super Sport's disk on the central diff housing—just aft of the spur gear—and it's activated by the throttle servo when you apply reverse.

SUPER SPORT SUSPENSION

The Super Sport has a four-wheel independent suspension with oil-filled, coil-over shocks on all corners as well as lower



S P E C I F I C A T I O N S

Manufacturer Mugen
Type 4WD gas buggy
Scale 1/8
Price \$419

DIMENSIONS:
Overall Length 17.5 inches
Width 12 inches
Wheelbase 12.625 inches
Track (t/r) 10 inches

WEIGHT:
Gross (with engine) 7 pounds, 6.76 ounces

BODY:
Type Buggy
Material Polycarbonate

CHASSIS:
Type Pan
Material Aluminum

DRIVE TRAIN:
Primary Spur/pinion
Transmission Gear
Differential(s) Gear
Bearings/Bushings Ball bearings

SUSPENSION:
Front/Rear: Type Upper and lower A-arm
Damping Oil-filled, coil-over shocks

WHEELS:
Front: Type Molded spoke
Dimensions (DxW) 3x1.5 inches
Rear: Type Molded spoke
Dimensions (DxW) 3x1.5 inches

TIRES:
Front/Rear Medium spiked rubber

OPTIONS AS TESTED:

Airtronics Caliber 3P transmitter; Airtronics 94738 servo; Futaba 9302 servo; NovaRossi 2000 .21 engine; DA Graphite graphite/aluminum composite chassis; Bru-LineProof toggle switch; K&N air filter; five Sanyo 1000mAh cells; Motion Graphics custom paint scheme.

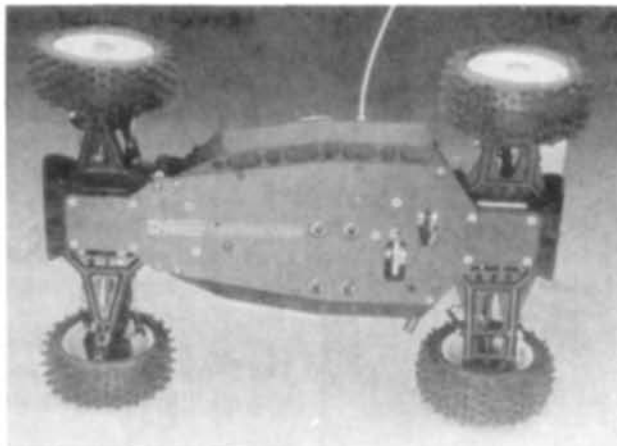
COMMENTS:

The Super Sport is a well-designed, well-manufactured off-road gas car that's as easy to assemble as most 1/10-scale electric off-roaders. It costs a little more to get it running, but it doesn't cost much to maintain. (The rising popularity of 1/8-scale cars ensures that replacement parts will be available.) The Super Sport exceeded most of my performance expectations. It's the current IFMAR world championship car; what more can I say?

Mugen Super Sport

and upper molded A-arms up front and in the rear. The upper arms are necessary on large 1/8-scale gas cars because they prevent the lower ones from flexing during acceleration, braking and cornering. Up front, small tie rods prevent the upper and lower arms from separating during severe jolts.

The arms are attached to the gearcases by steel hinge pins, which are basically long, button-head screws with threads running from their ends to approximately 1/4 inch along. Each passes through one suspension-arm mount and the arm itself and is then screwed into the other mount. (Note: the hinge pins have either left- or right-hand threads and you must use each on the appropriate side of the car. This setup prevents them from loosening when the arms travel upward during operation.)



I replaced the heavy stock chassis with DA's graphite/aluminum composite chassis. Its aluminum top part serves as a heat sink for the engine. The nylon side guards keep dirt and debris out of the chassis.

Up front, you can adjust caster using shims. There are two mounting positions for the eccentric steering-hub carrier mounts. The one you choose will determine the amount of front-end camber. Both front steering-hub carriers are supported by pivot balls, so they move freely.

The Super Sport's rear suspension is similar to that on the front, but you adjust the camber by screwing or unscrewing the ends of the upper arms.

SUPER SHOCKS

One-eighth-scale off-road cars usually use larger oil-filled shocks than their 1/10-scale counterparts. This isn't overkill; nitro-buggies need as much damping as possible! The Mugen comes with four aluminum shocks—those for the rear are slightly longer than those for the front—with progressive-rate springs on both ends.

To reduce chassis roll, the kit also includes sway bars of two thicknesses. (I found that the thin bar provided

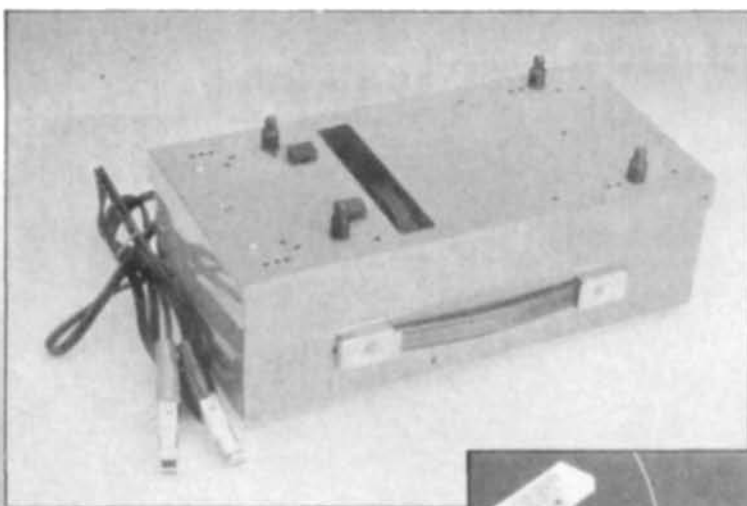
the Super Sport with more rear traction.)

STEERING SYSTEM

The size and speed of 1/8-scale off-road cars and the weight of their wheels and tires put incredible loads on the steering

To run a gas car, you need a 12V starter. Some gas engines have built-in pull-starters, but the extra weight of such assemblies hinders overall performance. For serious gas racing, separate starters are essential.

You can buy either a relatively inexpensive hand-held starter, i.e., a rubber wheel attached to a 12V DC motor, or a starter box. The box has four alignment posts that key into a car's chassis and a switch that's activated by pressing the car against it. The switch controls a 12V starter that's in the box. The starter's rubber wheel contacts the engine's flywheel and "spins" the



engine to life. The starter box shown is a universal-type, off-road buggy unit offered by DuraTrax*. It has a heavy-duty adjustable switch and a convenient carrying handle. (For more information on starter boxes, check out "Start Me Up!" in this issue.)



...and they're

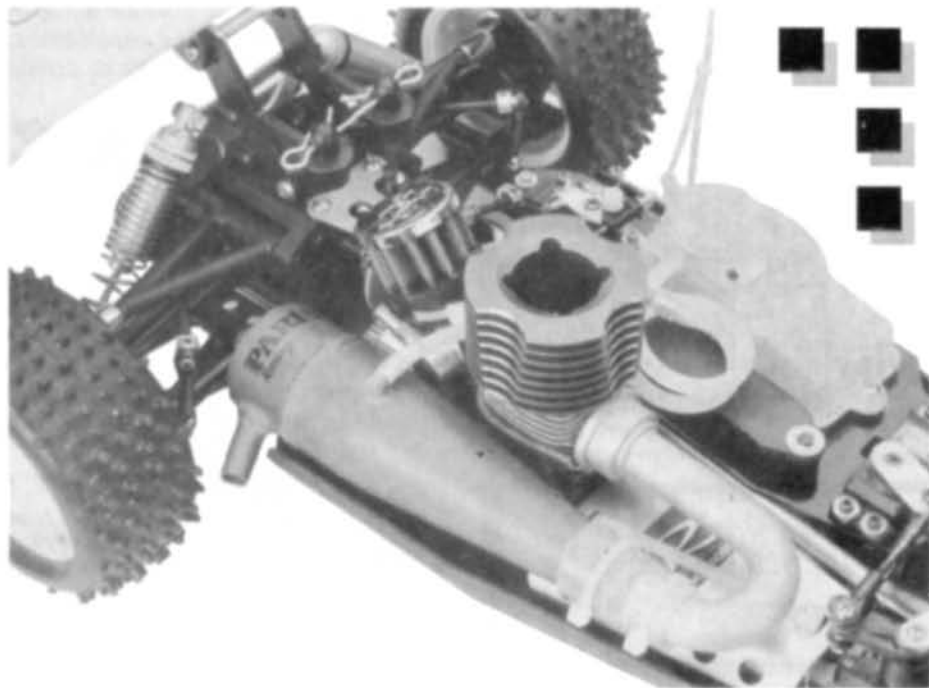
off!

system, so their steering linkages must be extremely strong. The Super Sport has a twin servo-saver bellcrank system, and you can adjust each servo-saver independently to vary its shock absorption. The servo-savers are connected by two tie rods, so the the impact to which one wheel is subjected is partially transferred to the opposite wheel's servo-saver. This prevents the car from "wandering" if one wheel receives a heavy jolt.

Obviously, a normal servo wouldn't last long in this situation, so I chose Futaba's* S9302 coreless motor servo. It has brass gears, an amazing 99 ounce/inches of torque and a transit time of 0.19 second/60 degrees—perfect for my needs.

INNER WORKINGS

You don't need motors, speed controllers, or "hot" matched battery packs to run gas cars; you do, however, need a



The NovaRossi engine and the Paris tuned pipe provide exceptional low-end torque and blistering top-end speed. A K&N air filter keeps dust and dirt out of the combustion chamber.

receiver, an engine, a pipe, a throttle servo and a battery pack for the radio.

● **Nitro power.** Most .21 engines provide enough horsepower to satisfy anyone's need for speed, but I wanted the max!—NovaRossi's* 2000 five-port engine. Called the "redhead" because of its red-anodized cylinder-head heat sink, this reasonably priced, high-performance engine fits the Super Sport's engine-mounts perfectly.

The exhaust pipe can be critical in determining an engine's performance, and its length is often varied to tune an engine to certain track conditions. I use a Paris Racing Products* High Energy Quiet Pipe, which is designed to pick up an extra 1,500 to 1,800 of bottom-end rpm, and as much as 3,000 to 4,000rpm of mid-range power. This pipe substantially increases engine power and the car's "driveability."

● **Radio power.** To power their radios, most gas-car racers use 5-cell 650mAh AA Ni-Cd packs. If the on-board radio gear loses power during a run, the car will run away, so to prevent this, I use five 1000mAh Ni-Cds instead. They have slightly higher capacities than the 650s, so they last longer.

● **Radio tray.** You mount the Mugen's radio gear, i.e., servos, receiver, etc., and its fuel tank on a removable aluminum radio tray. The Futaba steering servo and the Airtronics* throttle servo (no. 94738) are bolted to directly to it, but the receiver is nestled inside a rubber "isolator" mount (to prevent it from being damaged by vibration), which is then attached to the tray. When it's time to clean the car, just unscrew the tray and lift it out of the chassis.

HELPFUL HINTS

The Mugen Super Sport was my first gas car, so I asked several experienced gas racers for pointers before I ran it. I learned that the switches that come with most radios often shut themselves off owing to engine vibration. To prevent this, I installed a Bru-Line* Proof stepped toggle switch. Its toggle must be lifted to be moved, so it's unlikely to move owing to vibration.

I learned that dust and debris are an engine's worst enemies, so using a high-quality air filter is extremely important! K&N* offers them for most engines, and they save you money in the

long run by preventing the pistons and cylinder sleeves from being damaged!

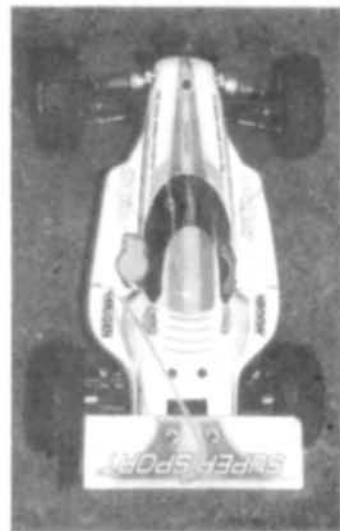
I discovered that it's important to use thread-locking compound on *all* the metal-to-metal connections. This prevents the car from "shaking" apart.

BEAUTIFUL BODYWORK

Nothing tops off a well-built R/C car like a nice paint job. Richard Muise of Motion Graphics* is one of the premier polycarbonate Picassos, and he whipped out a killer neon scheme for the Mugen!

It's important to trim a gas car's body so that cooling air will reach the cylinder-head's heat sink directly. This will ensure that the engine will run well and operate at safe temperatures.

(Continued on page 42)



Andy's

R/C PRODUCTS BEST FROM THE WEST



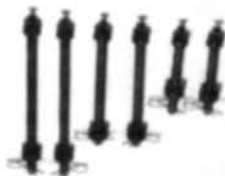
3152 LOTEK GTP, 1/10
Winner of '91 ROAR NATS
4152 LOTEK GTP 1/12 SCALE



RC-10T STADIUM TRUCK
Racing Truck body.
PART # 3033



NASCAR 1/10 • 1/12
SUPER SPEEDWAY 1/10
.030 LEXAN BODIES



BODY POST
3206 2 INCH "ON ROAD" BODY POST (pair)
3297 3 INCH "ON ROAD" BODY POST (pair)
3288 4 INCH "ON ROAD" BODY POST (pair)
3295 BODY POST SET "OFF ROAD"

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SUPER SPORT

(Continued from page 41)

ROAD TEST

To get the Mugen running, I needed a 12V starter wheel (see sidebar), a glow-plug igniter and, of course, fuel. After I had broken-in the NovaRossi (see "Nitro News" in the March '92 issue), the Super Sport was ready to be put through its paces.

Gas cars traditionally have a little low and mid-range power, and their top end comes on hard and fast. The Paris pipe made the Super Sport as easy to drive as most electrics, even though top end still caused all four wheels to produce rooster tails and divots. Just remember that you have to *physically* apply the brake. I forgot this and, when I let off the throttle while attempting to buzz John Huber, I hit his pit box and sent it—fuel and all—flying!

On open ground, the Super Sport is an absolute *scream*! It easily handles obstacles that would cause my Yokomo to flip over. It has excellent turning capabilities, so good, in fact, that you must be careful to avoid traction rolling!

What's the verdict? Gas cars are a blast! With their sounds and smells, they're as close as you can get to driving a full-size race car without strapping on a seat belt. The Mugen Super Sport is one of the best cars on the market; in fact, it's the current world champion. It may cost more to get started in gas-powered R/C, but the cost of running is comparatively small—especially when you consider its high fun-to-dollar ratio! I'm hooked on gas!

*Here are the addresses of the companies mentioned in this article:

Mugen; distributed by Ace Hardware and Hobbies, 1863 El Camino Real, Burlingame, CA 94010.

DA Graphite, 1235 Portola Ave., Spring Valley, CA 91977.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

NovaRossi; distributed by Rossi USA, 214 Harvest Ave., Staten Island, NY 10310.

Paris Racing Products, 4245 Independence St., Chino, CA 91710.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

Bru-Line Industries Inc., P.O. Box 3786, Center Line, MI 48015.

K&N Engineering Inc., P.O. Box 1329, Riverside, CA 92502.

Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21158.

DuraTrax; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826. ■

LETTERS

(Continued from page 9)

Hasn't anyone ever told you that it's impolite to ask too many questions? Just kidding, Steve! Because you're only charging SCRs, you need a pulse charger rather than linear one. The Novak chargers have

(Continued on page 66)

WORLD OF TRAINS

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MRC BLACK FOOT	97.50	MRC MUDBLASTER	99.99	RC10 (6010) CAR	110.95
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ASSOCIATED'S* RC10 is the most versatile R/C car ever made. There are more conversion kits, after-market parts, trannies and redesigned suspension systems available for it than for any other R/C car. The possibilities are endless! Andy's* Pro Race kit is just one more example of the RC10's versatility.

THE KIT

The Pro Race kit, which can be used with any RC10, comes with a light, durable, molded graphite chassis that has raised edges to increase rigidity and to make body mounting easier. Because the chassis' front end is narrower than the stock one, the kit comes with a set of extended front A-arms so that the width of the front assembly is still correct for



by MIKE PAGANELLI

racing. Also included are a one-piece front bulkhead, caster blocks, steering blocks and hardened-steel, in-line front axles. To adjust caster, replace the kit's caster blocks with Associated blocks.

Rounding out the front end is a rack-type steering setup that includes ball bearings. A nylon rack slides back and forth in a nylon guide that's mounted to the chassis directly behind the front shock tower. A ball-bearing bellcrank connects the rack to the servo. Although it operates very smoothly, fine dirt can accumulate in the rack and cause binding. On less dusty surfaces, this isn't a problem, but you should keep an eye on the assembly and clean it occasionally.

ANDY'S

PRO RACE KIT

Fearsome Facelift!



"... transform your
RC10 into a lightweight
racing machine."

PRO RACE KIT

The kit also comes with two rear-suspension setups: the traditional A-arm suspension and a trailing-arm suspension. A shock tower is included for each suspension option, and a rear bulkhead that's much stiffer than the RC10's is also included. All the suspension components are made of Andy's lightweight nylon, and the shock towers and chassis are of molded graphite.

WHAT YOU NEED

To build this kit, you'll need hinge pins, turnbuckles, ball joints, shocks, universals (or dogbones and rear axles), ball bearings, wheels, tires, a transmission and a body. There are two ways to approach this project: if you already have an RC10, you can take the necessary equipment from that car and transfer it to the Pro kit, or you can do what I did, and build a totally trick race car from scratch. (If you plan to build from scratch, be sure that you have enough hardware to finish the job.)

It's fairly easy to put the car together, but there are some spots that will need a little extra work. The front suspension arms need to be filed slightly so that they'll move smoothly with the caster blocks. It isn't difficult to do, and it makes a big difference in the car's performance. I used Tecnacraft* titanium hinge pins and turnbuckles. These hinge pins are slightly oversized, so the holes in the suspension arms must be reamed

slightly. If your components are used, you might not have to do this, but the fit is tight with brand-new parts.

After I assembled the steering system, I noticed a large amount of bump-steer, so I drilled two $3/32$ -inch holes in the

rack, $1/8$ inch in from the existing holes. This allowed me to elongate the tie rods slightly, which effectively reduced bump-steer.

FAREWELL TO A-ARMS

For a change of pace, I decided

blocks that allow you to choose 1, 2, or 3 degrees of toe-in. As a starting point, I set toe-in at 2 degrees.

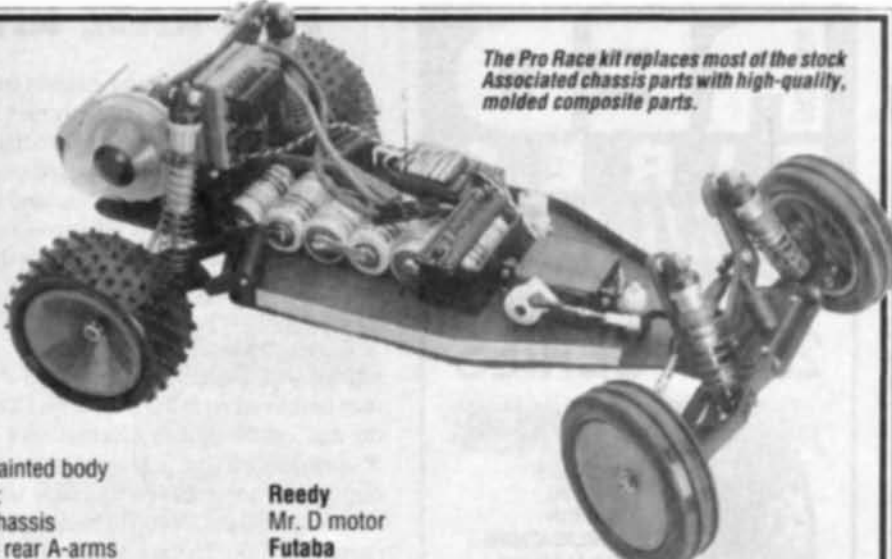
If you use the trailing-arm suspension, I recommend that you use Associated's universal axles. You can use dogbones, but you might have to limit the shock's down travel to prevent them from popping out. The universals are slightly longer than the dogbones, and they won't get lost if they become dislodged.

THE KILLER STUFF

Choosing shocks and a transmission would have been difficult over a year ago, but now, Associated has made it easy. I used Associated Team shocks (long rears and long fronts). These hard-anodized shocks are wear-resistant, and the Teflon coating makes their action super smooth. I started with Associated 30WT oil in the rear and 20WT oil in the front.

to try the trailing-arm rear suspension. I've seen John Huber race with A&L* arms on his RC10, and he seemed to do very well with them. The arms included with the kit are very similar, but they're molded of light nylon rather than aluminum. The kit includes mounting

PARTS



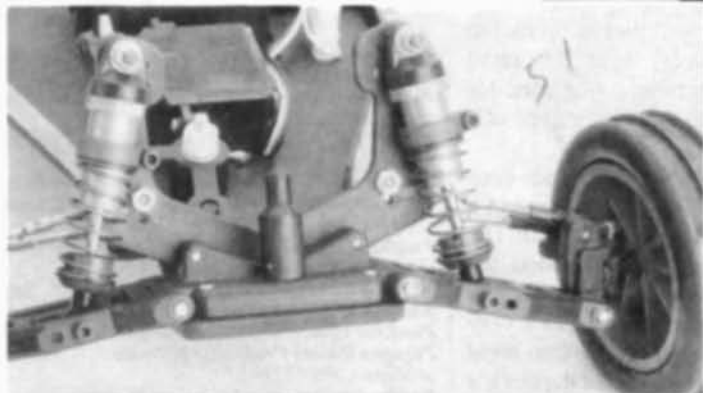
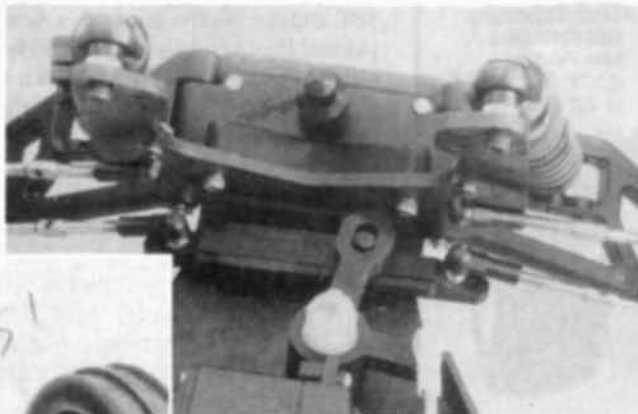
The Pro Race kit replaces most of the stock Associated chassis parts with high-quality, molded composite parts.

Andy's
Pro-Arrow painted body
Pro Race kit:
Molded chassis
Front and rear A-arms
Rear trailing arms
Rear hub carriers
Trailing-arm mounts
Three shock towers
(one front, two rear)
Ball-bearing bellcrank steering
Rear bulkhead
Front bulkhead
Caster and steering blocks
Battery holder

Reedy
Mr. D motor
Futaba
Futaba PCM 1024
radio system
Pro-Line
Pro-20 rear tires
DA Graphite
Custom shock tower
Novak
410-M1c ESC
Paragon
19-turn double-wind motor

Associated
1.32-inch Team shocks
0.71-inch Team shocks
Stealth tranny
Ball bearings
Universals
Front and rear rims
Front three-ribbed tires
Miscellaneous hardware

A ball-bearing, rack-type steering system is included in the kit. Although its operation is very smooth, fine dirt may accumulate in the rack and cause binding.



The front end of the Andy's chassis is considerably narrower than the stock RC10's. Associated's long front shocks are perfectly suited to the increased suspension travel.

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PRO-22

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Track Conditions
DESIGN: Spike
Fits 2.150"
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Rear Wheel.

PRO-81

WINTER
CHAMPION
MINI-PIN
APPLICATION:
Medium to Hard
Track Conditions
DESIGN: Mini-Pin
Fits 2.150"
PRO-LINE® or 2.2
Rear Wheel.



PRO-82

ULTRA MINI-PIN
"FUZZIE"
APPLICATION:
Medium to Hard
Track Conditions
DESIGN: Ultra
Mini-Pin Fits
2.150" PRO-LINE®
or 2.2 Rear Wheel.

PRO-101

WORLD'S
SPECIAL
EDITION
APPLICATION:
Soft to Medium
Track Conditions
DESIGN: Stepped
Spike Fits 2.150"
PRO-LINE® or 2.2
Rear Wheel.



*Fits PRO-LINE 2577 (RC10) or 2578 (LOSI)

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PRO RACE KIT

There are so many after-market trannies for the RC10 that you could go crazy trying to pick one. Thanks again to Associated for its Stealth tranny! If you've used one, you know what I'm talking about, and if you haven't, you don't know what you're missing. I think that the Stealth tranny is the best there is. Its three-gear design is quiet, smooth and very efficient.

If you mount the Stealth tranny, you'll need to cut a small groove in the Andy's rear bulkhead so it fits properly. (You can do this easily with a Dremel tool or an X-Acto knife.) Check the fit as you go; you don't want to remove any more material than is necessary. You'll also need to drill mounting holes in the chassis. (If you buy a new tranny, a template is included with the kit.) The assembly instructions for the Stealth tranny are perfect, so I won't even begin to explain them here.

I use my Futaba® PCM radio system because I think it's the most reliable system available. I also use a Futaba 9301 servo and a Novak® 410 M1c speed controller. The 9301 isn't Futaba's fastest servo, but it's very strong, and it's easy to find at most hobby shops. The ESC's size and its up-right wiring make it ideal for mounting on the chassis. (I used a Novak T1-X for the photos, but for testing, I used the 410-M1c.)

I chose Associated's three-ribbed tires and one-piece rims for the front, and I use Pro-Line® Pro 20s with Associated's three-piece rims in the rear.

For a totally trick car like this, I wanted a totally trick body, so I called Andy himself and he gladly sent me a beautifully painted Pro-Arrow body. The body is specifically designed for this kit, so it fits like a glove. (Velcro® secures the body to the chassis.) Now, I was ready to rock 'n' roll!

TRACK

Dr. Pond asked me to use a 19-turn double-wind Paragon® Eclipse motor that he had. This went against all my killer instincts, but I decided to give it a try. John Boy and I packed up our equipment and headed for Queens Off-Roaders, a large, indoor off-road track in our area.

I decided to test the car under race conditions, so I drove it for the first time in a qualifying heat. It ran extremely well! The track was very loose, so I adjusted the slipper on the Stealth tranny and the car was dialed-in. The Paragon motor had a very smooth power band, but the 19-turn wind didn't provide enough speed for the track's long straights. I switched to a Reedy® Mr. D, a 14-turn quadruple-wind motor that



There are two options when it comes to the rear suspension: you can use traditional A-arms or the trailing-arm setup shown here. Mounting blocks are included for the trailing arms so that you can adjust the amount of rear toe-in.

gave the car the speed it needed to be competitive.

Even with this added speed, the car handled flawlessly. It tended to oversteer, but that didn't bother me, because I like my cars set up that way. I'm not going to tell you that I TQ'd, won the A-Main and set a new track record, because I didn't, but the car is capable of doing well against the best cars out there.

There's only one small problem with this kit: the front shock tower included with the kit keeps giving me trouble. If the car lands upside-down, the tower breaks. I've broken three so far! I decided to replace it with a super-tough, graphite tower from DA Graphite®.

All in all, I love the Pro Race kit. It allows you to transform your RC10 into a lightweight racing machine. Considering what's included in the kit, the price may surprise you: it lists for \$159.95, but I've seen it offered for under \$100, which makes it a super buy. If you have a tired old RC10, Andy's Pro Race kit is just the thing to bring it back to life!

*Here are the addresses of the companies mentioned in this article:

Associated Electronics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

Andy's R/C Products, 1710 Grevelia Ct., Ontario, CA 91761.

Tecnacraft, 1335B Dayton St., Salinas, CA 93901.

A&L Manufacturing, P.O. Box 2115, Corona, CA 91718.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

Pro-Line USA, P.O. Box 456, Beaumont, CA 92223.

Paragon Racing Products, 690 Industrial Circle So., Shakopee, MN 55379.

Reedy; distributed by Associated Electronics.

DA Graphite, 1235 Portola Ave., Spring Valley, CA 91777.

SCOPING OUT by JOHN RIST



Hitec SP-1802N

HITEC* IS KNOWN for its no-frills, reasonably priced electronic equipment. This month, I'll examine Hitec's SP-1802N ESC to see if, despite its bargain price, it's a useful speed controller.

I usually remove the speed controller's case to see how the controller is constructed, but I could skip this procedure with the SP-1802N, because its housing is transparent. This controller uses insu-

lated tab FETs to handle the power (five for forward and one for brakes). A standard heat sink won't fit the insulated tabs, but Hitec provides one that does. If you remove

the heat sink, be careful not to lose the copper spring inserts that provide contact between the heat sink and the FETs. The rest of the controller has standard parts and the construction looks good.

The SP-1802N's features are:

- Forward-only (no reverse) controller with brakes;
- Six FETs (five for forward; one for brakes);
- Tamiya battery connector;
- Bullet motor connectors;
- Futaba J receiver connector;

- BEC with on/off switch;
- 5- to 10-cell operation.

It comes with an instruction sheet, heat sinks, mounting tape and a screwdriver.

I always read the instructions provided with a controller before I test it. Hitec points out that if you plan to use more than 7 cells, you should leave the BEC switch in the "off" mode.

The drawing labeled "connection" shows two hook-ups, one for five to seven cells, the other for "up to 10 cells." There isn't an explanation with the picture, and it isn't clear which color wire goes to which side of the motor. (The blue wire goes to the negative side and the white wire goes to the positive side. Of course, if your car runs backward, reverse these two leads!)

The controller doesn't have a built-in pulse checker to indicate full throttle, and the instruction sheet doesn't offer a way to ensure full-throttle operation.

The last section of the instructions explains that if the controller is contaminated with salt water, you should rinse and dry it thoroughly before you use it. It also warns that if your motor gets

(Continued on page 60)

"SCOPING OUT" LAB AND TESTS

• THE LAB consists of:

- an oscilloscope
- a digital voltmeter
- a variable-load resistor bank
- a 6V 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors that can be switched on and off one at a time to vary the load between 6 amps and 20 amps, but the

standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent 0.01-ohm resistor. By measuring the voltage drop across this resistor, the current meter's reading can be double-checked. Of course, the lab power supply provides the test current.

• **VOLTAGE-DROP TESTS.** These are the first tests. It's virtually impossible to read an ESC's resistance directly, so I measure the voltage drop across it with the resistor bank set up for 12 amps of current. I then calculate the controller's "on" resistance by dividing the measured voltage drop by 12 amps. I take the voltage reading twice: along the full length of the battery and motor wires (including con-

nectors) and 2 inches along them. The first reading helps me to determine an ESC's "on" resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• **LET-IT-COOK TEST.** I adjust the resistor bank to pass 20 amps of current, then I jam the throttle wide open and let the ESC pump the 20 amps.

• **DEAD-SHORT TEST.** With this test, I check whether the controller can survive the heavy current caused by a jammed gear or a fried motor. No one likes to have this kind of trouble and discover that his ESC has been destroyed, too.

SCOPING OUT

(Continued from page 58)

HITEC SP-1802N

DIMENSIONS:

Height	0.82 inch
Width	0.67 inch
Length	1.65 inches
Weight with wires	1.95 ounces

TUNING:

Access to controls	Good
Ease of adjustment	Fair

PRICE:

Price	\$59.95
Warranty	1 year

ELECTRICAL:

(Manufacturer's Specs)

Max voltage	15 volts
Min voltage	6 volts
Max current	600 amps
Continuous current	150 amps
Resistance	0.01 ohm

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps
Voltage drop, end to end	0.32 volt
Voltage drop, 2-inch point	0.15 volt
Resistance to end of wires*	0.026 ohm
Resistance, 2-inch point*	0.013 ohm
BEC voltage, 6-cell pack	5.16 volts

*Resistance = voltage drop / current

COMMENTS:

The SP-1802N is an excellent entry-level speed controller. Its apparent ruggedness and its low price make it an ideal replacement for the problem-riddled mechanical speed controllers found in many buggies. The instructions were practically nonexistent, but I had no trouble installing the controller because a full set of motor and battery connectors were already installed. During road testing, it became apparent that the SP-1802N has built-in current limiting. This feature limits acceleration somewhat, but it will also protect your motor and battery if you overgear the car.

stuck, you shouldn't hold the throttle down for more than 30 seconds, because it might damage the ESC. One thing that's missing is an explanation of the warranty and an address to which you can return the controller if it's not working properly. I checked with Hitec and found that their products are covered by a full, one-year warranty.

When I connected the SP-1802N and turned it on, I found that the neutral control had a rather large range. This enabled me to match the controller's neutral setting to the neutral throttle setting on my Futaba* Magnum JR radio. I played with the full-throttle setting and found that (while observing the pulses with my oscilloscope) acceptable operation could be obtained by turning the control to its full clockwise position.

Because the SP-1802N doesn't have a built-in pulse checker to indicate full "on," I recommend that you run with this potentiometer at fairly close to full clockwise. A guarantee of full power is usually more important than throttle range.

VOLTAGE-DROP TESTS

The voltage drop along the full length of the wires was 0.32 volt. This puts the resistance at .0266 ohm. The reading at 2 inches along the wire was .15 volt—a resistance of .0125 ohm. It's definitely not world-class low, but it's low enough to make this a useful controller. The above numbers do indicate, however, that the Tamiya battery and the bullet motor connectors are performance killers. It will pay to replace them with premium ones.

LET IT COOK

I jacked the current up to 20 amps and let the controller run for 15 minutes. (I used the provided heat sink, but not a cooling fan.) It was December, and it was cool in my shop, but the SP-1802N became so hot that it would burn my finger if I touched it for more than a fraction of a second. This is about what I expected, considering the slightly high "on" resistance. Despite its heat, the SP-1802N never faltered. It seems to be tough enough to take a heating and keep on eating—the current, that is.

THE DEATH SHORT

When I jammed the pedal to the metal, the current jumped to a screaming 60 amps! I quickly pulled the wall plug on the bench supply, but the heavy current kept flowing, and I started to get some serious smoke. I realized that I had left the controller connected to the 6-cell battery pack. I finally unplugged the pack, and a quick check of my stopwatch revealed that the short had lasted for about 60 seconds.

The Tamiya connector was destroyed, and everything—including the battery and the wires—was too hot to touch. I let the speed controller cool for about 15 minutes, and then I fired it up again. It sprang to life and pumped current quite normally.

ON THE ROAD AGAIN

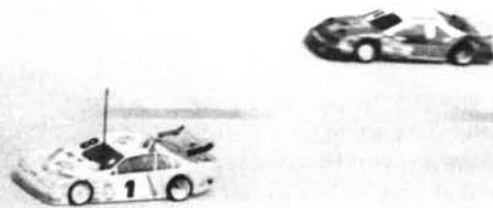
I mounted the controller in my TRC* Sport 1/10-scale pan car with a 1940 Ford body. I have a Speedworks* Boss stock motor in the car, and I run it with a 6-cell, 1700mAh SCR battery pack.

I turned the car loose in a parking lot and found that the SP-1802N had fairly good throttle and braking response. The car seemed to run forever (12 to 14 minutes), but it wasn't very fast. A check of the gearing revealed that the car had a very small pinion gear, which would account for such performance. At the end of this run, the SP-1802N was ice-cold, but of course, I wasn't working it hard.

I wanted to push the SP-1802N to see what it could do, so I installed a much larger gear. Much to my surprise, the car's acceleration was wimpy, although its top speed was much faster. Run times were still quite long, indicating that something was limiting the current. At the end of the run, the heat sink was just slightly warm.

I suspected that the SP-1802N had a built-in current limit, and, to confirm this, I replaced it with a monstrous 8-FET controller meant for use in hot trucks with modified motors. The car now had wheel-spinning acceleration and good speed, so I concluded that the SP-1802N *does* have a built-in current limit. (This would explain why it can withstand considerable abuse.)

(Continued on page 60)



by LARRY COLE

ASSOCIATED'S introduction of the narrow version of its RC10L—the RC10L SS (superspeedway)—sparked a debate between racers who prefer the new narrow cars and those who insist that wide cars are still the best choice. After listening to arguments from both camps, I decided to go where no one has gone before...to the source! Some of what you're about to read is straight from the manufacturers, and the rest is opinion. (Remember, opinions are like elbows; everybody has them!)

I'll trash one argument right away. Many people allege that narrow cars are more "to scale" than their wider brothers. Since *neither* type is truly "to scale," this argument should have little or no bearing on which car you choose. (If you disagree, just remember what I said earlier about opinions.)

I compared Bolink's standard LTO (left-turn-only) with its narrower sibling—the new 1/10-scale LTO SS. What applies to these cars will apply to any LTO, whether it's a 10L, a Lynx, or a Studebaker. (All right, Studebaker never made an R/C car, but you get the point!) Let's examine the claims made by those in the narrow-car camp first.

NARROW

Because their bodies have smaller frontal areas, narrow cars experience less drag, so they're faster on long straightaways. They're also lighter—sometimes below minimum weight requirements—so you often have to add weight to them, and you can position the weight to suit your needs, e.g., position it toward the inside of the chassis to improve cornering.

Bolink advertises that its car bodies are "wind-tunnel tested," so I figured that someone who worked for the company would know whether the "narrow-phil's" claim of less drag is true. "In the testing, we found there was a significant difference between the drag of the wide car and the narrow car," said Bolink's Rick Jordan. "This would equate to higher straightaway speeds

WIDE VS. NARROW

for the narrow car, because there's less wind resistance to slow it down."

Is the narrow car lighter? The standard LTO weighs 44 ounces (2 ounces more than the ROAR-legal weight); the narrow LTO, 41 ounces. It cost \$75 (for light hubs, aluminum screws, micro receivers, etc.) to lighten the standard car. To increase the narrow car's weight, I spent \$4 on adhesive-backed lead.

Despite their many benefits, narrow cars are less stable—"twitchy"—in corners *and* straights.

WIDE

Wide cars are more stable because they have larger frontal areas and wider tracks. (This is why ROAR and other organizations have *maximum* width limitations but no *minimum* width requirements.)

Wide-car advocates also claim that they have better handling characteristics. Gary McAllister of McAllister Racing agrees, "We haven't yet been able to prove that the speed gained by a narrow car on the straightaways offsets the speed that can be carried by a wide car through the corners. We're playing with the narrow concept a bit, but it's still in the preliminary stages. The real

question is, what kind of track [race course] is a 'narrow' track? Or, for that matter, can it be defined?" McAllister's new Oval Only would work well as a narrow car, but the company is reluctant to produce a narrow version.

Because they're heavier and experience more drag, wide cars are slower. Extra weight, however, can be beneficial on small outlaw "bull-ring" tracks where no one ever checks weight. If a wide car and a narrow car touch in a corner, you can bet your dearest aunt that the wide one will hold its line! Further, although it can be expensive to lighten wide cars, it costs less to lighten some, e.g., McAllister's Oval Only, than others, e.g., Bolink, Lynx, etc.

WHICH IS BEST FOR YOU?

So, which car is the best? Well, depending on the day of the week,

OVAl OPTIONS



Owing to its small frontal area, the narrow car's body (right) suffers less from drag than that of the wide car (left).

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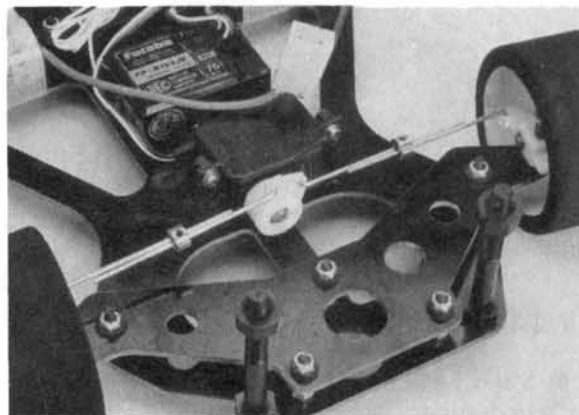
WIDE VS. NARROW

who you talk to and what position the stars are in, you'll get a different answer! Here's a list of facts that may help you decide which one is best for you.

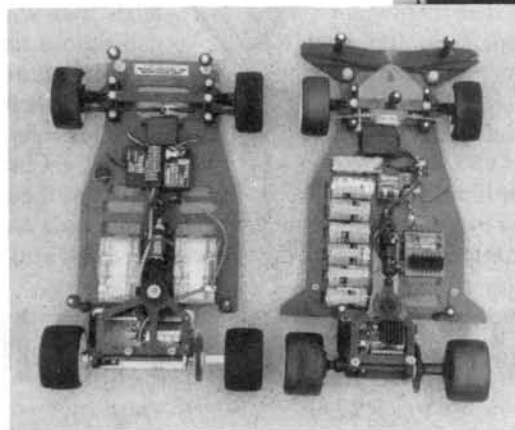
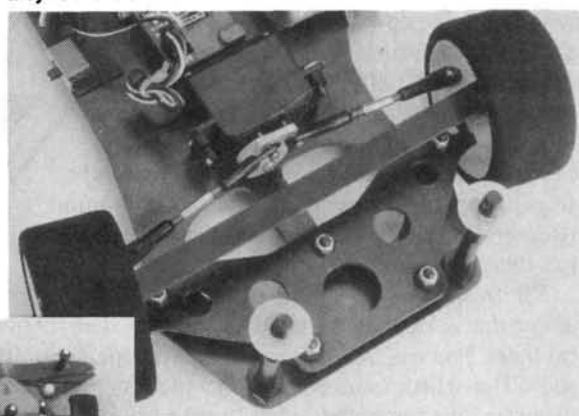
● **Consider your level of experience.** If you're a newcomer, start with a wide car because it's easier to drive. As you gain experience, you'll be able to handle the fast—but "touchy"—narrow cars better. When this happens, however, don't get rid of your wide car. It's best to have one of each; the wide car will work well on some tracks and the narrow car will work well on others.

If you're already an experienced driver, and you're looking for a little extra speed, then it's "narrow-car time" for you.

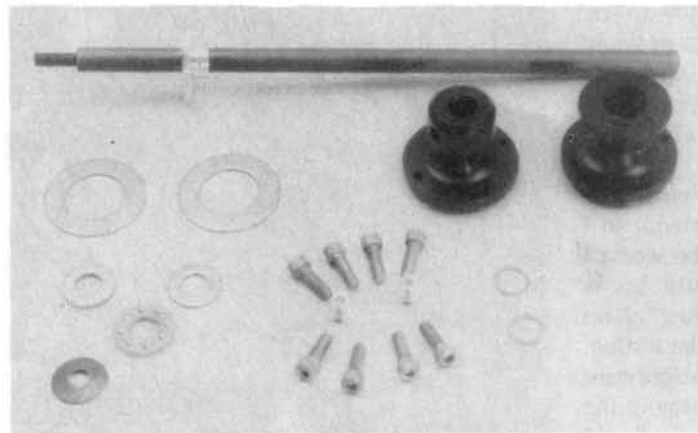
● **Consider the track on which you plan to run the car.** In general, wide cars work better on short, flat tracks. (You can run



They have identical chassis, but the Bolink LTO's track (above) is much wider than that of the LTO SS (below). Wide cars handle well, but they're heavier; narrow cars suffer less from drag, but they're more skittish.



Without their bodies, the cars are very similar. You have to examine their track widths to see the difference between them.



To lighten wide cars, replace stock parts/hardware with aluminum screws, graphite axles, light hubs, etc.

narrow cars on such tracks, but you must know how to adjust the car properly to do so successfully.) Narrow cars work well on long tracks and on those with high banks.

● **Determine your budget.** In general, narrow cars—and replacement parts for them—are more expensive. Using premium parts, manufacturers design and build narrow cars primarily for diehard racers. Newcomers usually break a few parts at first and often don't have the money for replacements.

With the introduction of short-track and superspeedway cars, scale R/C racing has become more like full-size NASCAR and ARCA racing. To complete the picture, we only need a Plymouth Superbird body on a Bolink SS!

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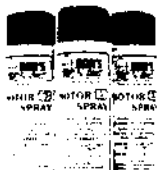
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LETTERS

(Continued from page 42)

both pulse and linear modes. The BC210 Pro-Flex pulse charger has Tekin's patented Pro-Flex rejuvenating circuitry, and you can switch the 100L from a pulse to a linear mode.

The Tekin chargers will work with most automotive battery chargers, but Novak doesn't recommend that you use them. (They aren't well-regulated and could damage the chargers.) Depending on the rate at which you charge your batteries, an automotive battery will provide power for more than 40 charges before it will need to be recharged.

As for SCR charging rates, the consensus seems to be 5 amps. Charging at a lower rate increases the discharge (run) time slightly; charging at a higher rate increases the voltage slightly. Breaking-in a motor using a charger could damage the charger, so I don't recommend it. None of the chargers should have any problems with false-peaking owing to radio interference. AS

(Continued on page 72)

SCOPING OUT

(Continued from page 60)

BOTTOM LINE

The affordable SP-1802N seems fairly bulletproof. It's also small, so it's an ideal replacement for the problem-riddled mechanical speed controllers found in most entry-level cars. Such cars often have a limited gear selection and use stock 05 motors, making them a perfect match for the SP-1802N. As your need for speed drives you to hotter motors and larger pinions, the SP-1802N's current-limit feature will prevent your motor from being fried if you overgear the car; yet it will permit a fair amount of raw speed.

This controller isn't well-suited to serious 4-minute racing, but it's ideal for box-stock, entry-level races that specify 05 motors and place price limits on equipment.

*Here are the addresses of the companies mentioned in this article:

Hitec; distributed by RCD Inc., 9419 Abraham Way, Santee, CA 92071.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.

TRC, P.O. Box 1058, Albemarle, NC 28001.

Speedworks; distributed by Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036. ■

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LETTERS

(Continued from page 66)

ARTISTIC AIR

Hey!! I have a JR-XT with a Slot Machine motor, a Novak 410-M5 speed controller and a Magnum Sport radio. I plan to buy an RC10T body and give it a "snaz" paint job. Can you recommend an affordable airbrush? Also, what is a slipper clutch? I have an idea, but I'm not sure. Great mag! Keep it up!

BRANDON WIGGINS
Chandler, AZ

Brandon, the Tamiya Spray-Work airbrush might be just the thing for you, and you can use your car's 6-cell battery packs to power it. The system comes with everything you need, including a compressor, a brush, wide and narrow spray nozzles, a color cup, a mixing jar and a hose.

A slipper clutch is a device that uses friction to limit the motor's torque so that wheel spin can be controlled. It's usually attached to the transmission's top shaft, where the spur gear is mounted. JH

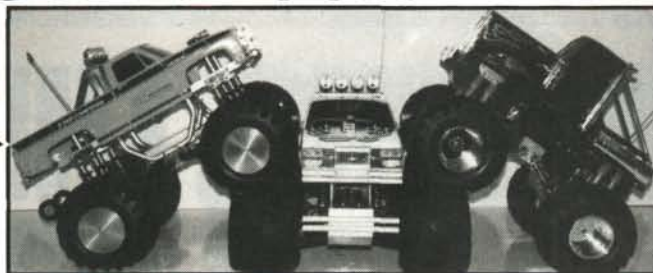
SERVO SURVEY

I use a Futaba S148 servo in my 4WD Lazer. I've just started to race in the modified classes, and this servo isn't fast enough or powerful enough to provide good steering response. I'd like to install a KO Propo PS 1001 FET servo, like that used in the '91 Yokomo. Are there any special power requirements for this servo because of the FETs? I use a Novak T-4 speed controller (which isn't a high-frequency controller), six cells and an Alpina

(Continued on page 74)

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Turbo Burns	\$419.99
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Mugen S.S.	\$399.99
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Impact 10 Comp.	\$285.00
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O.S. CZR	\$79.99
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Engines

Stock

Novarosi 5-Port	\$149.99
Novarosi 7-Port	\$169.99
Pico 5-Port	\$209.99
OS Rxb/Rxr	\$225.99
Rex 3-Port Buggy	\$189.99
Rex 6-Port	\$265.99
Rex 7-Port	\$269.99

Modified

Pico 5-Port	\$269.99
Rex 3-Port Buggy	\$239.99
Rex 6-Port	\$299.99
Rex 7-Port	\$345.99

Accessories

Rex Pipe Al650	\$35.99
Ops Filter/Boot	\$8.00
On-Road Bodies	\$17.00
Temp Gun	\$299.99
Futaba 9301	\$49.99
Futaba 9302	\$69.99
Much More!!!	

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On-Road

Bmt Universals	\$45.99pr.
Serpent Universals	\$45.99pr.
Alloy Wheels	\$89.99(4)
Bmt 3-Speed	\$175.99
Mounted Fr. Wheels	\$15.25pr.
Mounted Re. Wheels	\$15.99pr.
Many Alloy Parts!!!	

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Burns Fr. Brake	\$24.99
Burns Alloy Arms	\$49.99pr.
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LETTERS

(Continued from page 72)

PCM transmitter/receiver. Can these components produce the necessary power? If not, which components should I use?

JUSTIN ESSES
Chesterfield, MO

Justin, you can use a 1001 servo with your existing components. Plug it into your receiver using a standard three-wire plug. (Just be sure that the wires are oriented properly.) Connect the fourth servo wire to the positive lead on your battery pack. (Note: if you were using one of the new ESCs, instead of connecting this wire to the lead, you'd connect it to a wire that comes out of the ESC.) The 1001 servo comes with a choke coil that you might have to install in line with the fourth wire to prevent glitching.

JH

PACK IT IN

I've been involved in R/C racing for about a year, and I've been thinking about making my own battery packs. I don't have anything against factory-assembled

(Continued on page 82)

TEAM COBRA SMOKES 'EM AT THE WHIP!!!! 1991 LAKE WHIPPOORWILL U.S. OVAL MASTERS

John Broesler, TQ/Wins the A
IN MODIFIED, wins the A MAIN
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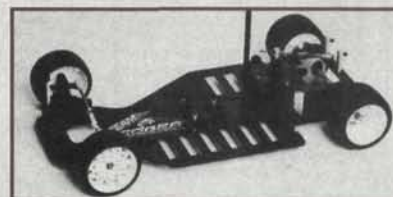
COBRA LTOOR
Q/WINNER A MAIN MODIFIED



"After having owned and raced all other competitive 1/10th scale cars, I can say that nothing compares to a Cobra. It was so much smoother, faster, and easier to get dialed in, that I was immediately turning more laps than I had ever turned before."

John Broesler

COBRA SS
WINNER A MAIN STOCK



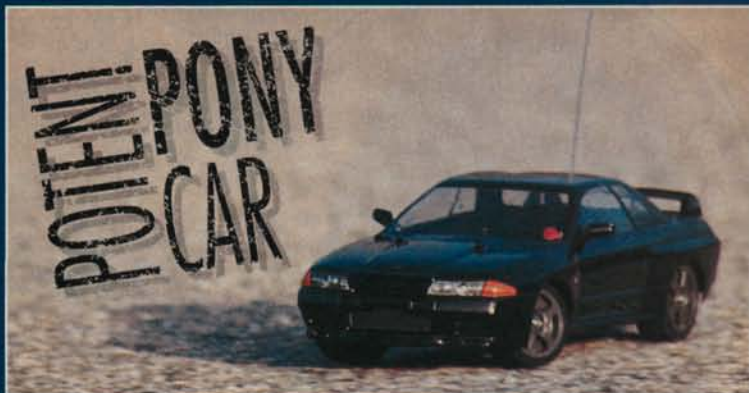
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BET THAT many of you don't recognize the car that graces these pages. It's a model of a full-size, high-performance Nissan called the Skyline GT-R. Don't expect to see the full-size car at your local Nissan dealer, however, because it's available only in the Land of the Rising Sun. The Skyline's closest counterpart in this country is one of America's favorite touring "sportsters"—the Ford Mustang GT. The 4WD Skyline GT-R uses all the latest technology and a supercharged, twin turbo V6 engine that revs 9,000rpm and cranks out 280 horses!

During my visit to Japan last summer, I saw this beautiful car perform and, believe me, it r-e-a-lly smokes! One night, I went to a dock where the radical dudes race and burn their tires on the asphalt. There were 300ZXs, Supras, a 'Vette (surprisingly) and, of course, a Skyline. The GT-R stood above the rest. Want to talk about Ferraris? Forget about it! Smoking both front and rear tires, the Nissan went from 0 to 60mph in 4.5 seconds! Impressive, huh? I hope Nissan changes its mind about exporting it to the U.S.!



TRACK REPORT

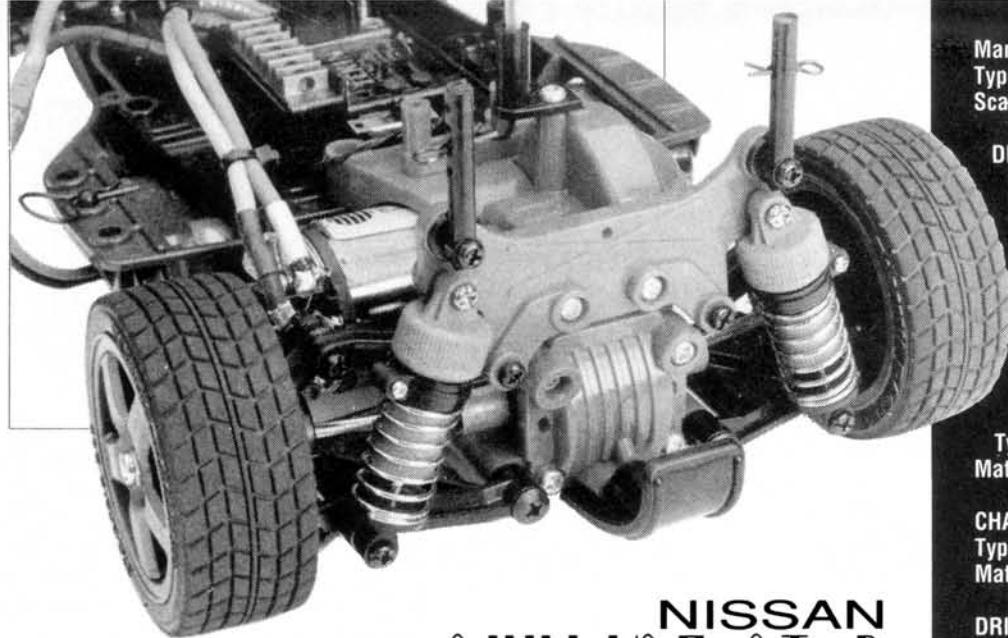


T A M I Y A

NISSAN

SKYLINE GT-R

by BILL BACON



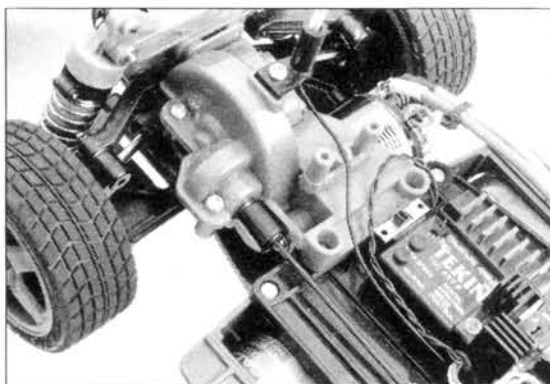
NISSAN SKYLINE GT-R

Since I couldn't buy a full-size Skyline, I decided that owning Tamiya's* new 1/10-scale version would be the next best thing. Like its full-size counterpart, this model's menacing looks are exciting, and its performance is impressive, too!

THE KIT

Tamiya made realistic appearance and handling priorities when they designed the Skyline. Its suspension has four short-stroke, oil-filled shocks and short A-arms. This gives it about 1/2 inch of travel and enables it to perform full-scale-like body rolls in the turns. The rear suspension has 2 degrees of toe-in, and this makes the car extremely stable during hard acceleration. Like the full-size car, the wheels are capped with rubber radial tires.

The Skyline uses Tamiya's traditional transverse shaft-driven 4WD system with a gear diff up front and a smoothly operating ball diff in the rear. The plastic tub chassis has a unique, "honeycomb" ribbed floor section that stiffens it. To access the differential unit, you only have to unscrew four screws on the maintenance hatch and remove it; to reach the secondary gears, just remove three screws and pop open the hatch. This easy-to-access drive



■ *Top: the competition-type ball diff in the rear gearbox is easy to access; just remove the hatch that's below the shock tower. With its oil-filled shocks and rubber radials, the Skyline really holds the road. ■ Above: the rear gearbox transfers power to the front wheels through a transverse drive shaft. The front diff is a bevel-gear affair that's easy to access from underneath the chassis.*

train makes installing ball bearings a snap.

Tamiya always does a great job with body detailing (remember, the company also manufactures plastic static models), and this glamorous body is one of their best. The body comes with pre-cut fender holes and pre-drilled body-post holes. This saves time (pinpointing the proper location of the mounting holes is never easy!) and prevents builders—especially beginners—from ruining the body.

■ *The Nissan's chassis is based on that of the 4WD off-road Tamiya Manta Ray. Short A-arms and drive shafts give the car a narrow stance and a realistic appearance.*

Manufacturer Tamiya
Type Scale race car
Scale 1/10

DIMENSIONS:

Overall Length 17.375 inches
Width 7.25 inches
Wheelbase 10.25 inches
Front Track 5.75 inches
Rear Track 6 inches

WEIGHT:

Gross (with battery) .. 3 pounds, 7.63 ounces

BODY:

Type Grand Turismo racing
Material Polycarbonate with plastic detail parts

CHASSIS:

Type One-piece tub frame
Material Plastic

DRIVE TRAIN:

Primary Pinion/spur
Transmission Secondary gear/shaft
Differentials Front gear/rear ball
Bearings/Bushings Bushings

SUSPENSION:

Type (f/r) A-arm with upper link
Damping (f/r) Oil-filled, coil-over shocks

WHEELS:

Type (f/r) Two-piece nylon
Dimensions (DxW) (f/r) 2x1 inches

TIRES:

Front/Rear Rubber radials

ELECTRICS:

Motor Mabuchi 540
Battery 6-cell stick pack*
Speed Controller Rotary

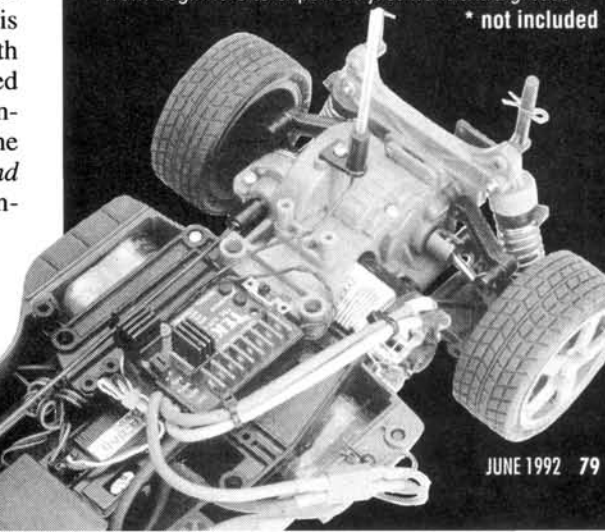
OPTIONS AS TESTED:

KO Propo EX-5 standard transmitter and receiver; Tekin TSC 420F ESC; New Wave Cells 6-cell matched Sanyo SCR pack; Trinity Gargantua 16-turn, double-wind modified motor; and 16 5x11 ball bearings.

COMMENTS:

You can easily access virtually every part that needs maintenance on this well-designed car. Its clear polycarbonate body comes with the wheel-well openings and the body-mounting holes cut out. Be careful when you assemble the rear ball diff: although the various parts are similar, it's important to put each in its proper place. This car has a little something for everyone—from beginners to experts. I just want extra grease!

* not included



NISSAN SKYLINE GT-R



ASSEMBLY

Building this car is a breeze, and it only took me about 4 hours to complete all the chassis components. The instruction manual has such a superb layout that you could almost build the entire car without reading the text.

First, build the rear ball-diff assembly. If you've ever built a conventional ball diff, you won't have any problems. Just read the directions very carefully, especially those about how to install the cone washers that press on the drive rings. If you don't stack

the washers correctly, the unit will be too stiff, because the washers won't be compressed properly.

"Thumbs up" to Tamiya for providing extra diff balls (and thrust bearings). I didn't lose any this time, but I remember losing one while building a Stealth tranny diff for an RC10. (It rolled off the table and into the carpet, where it was history!) I spent \$12 for a set of carbide diff balls, because they don't come packaged separately. I hope other companies will start to include these extras in their kits.

The front and rear output axles (the pieces that accept the dogbones) look alike, but they *are* different, so study the diagrams of them in the instructions. You must install them in the proper places, or the dogbones will bind in them. For the shock absorbers, the instructions suggest that you use three-hole pistons, but I found that the two-hole pistons work better with the kit-supplied shock oil.

After you've assembled the major chassis components, slip the tires onto the wheels; they fit snugly and will stay in place without glue. (The instructions tell you to glue them in place, but it's unnecessary. If you do, you probably won't mount them perfectly true, and you won't be able to remove them if you don't like the way they perform!)

After I had completed the chassis section, I was surprised to see that the car had a lot of toe-in. But hey; no problem! I just shortened each steering rod by the same small amount until the wheels were positioned parallel to each other (looking down from the top of the car).

That's about all there is to assembly! There's one thing I think I should mention, though. I always seem to run short on bearing grease. How about including an extra tube, Tamiya?

POWER SOURCE/RADIO SYSTEM

I use a KO Propo* EX-5 radio and a Tekin* TSC-420F electronic speed controller. (The 420F is kind of "overkill" for this project, but it was the only controller I had lying around!) My RC10 battery packs wouldn't fit into the Skyline's battery slots, so I ordered a 6-cell 1400mAh SCR pack from New Wave Cells*.

I wanted to test the car using the stock 540 as well as a wacky, wild modified motor that would provide awesome power without running down the battery in 2 minutes. I chose

(Continued on page 103)



The Skyline has an independent, four-wheel suspension with oil-filled, coil-over shocks on all corners. Its stable handling characteristics replicate those of its full-size counterpart.

If you plan to run your Skyline GT-R (or any car, for that matter) frequently, it's best to replace its plastic and bronze bushings with ball bearings. The car requires 16 5x11mm bearings and six 5x8mm bearings.

Plastic bushings wear noticeably after several runs, and they eventually develop slop. Imagine what would happen to your expensive transmission if the gears started to wobble!

(I hate to see guys who've stripped their cars' transmissions come into the shop where I work.) If you can afford

it, replace them with the larger bearings right away.

Bronze bushings last longer, but not forever. If your pockets are deep enough, it's best to replace them right away, too. (I didn't have the smaller 5x8mm bearings when I assembled my Skyline, so I decided to live with the bronze bushings.)

You don't need ball bearings to enjoy driving the Skyline, but they're better for the car in the long run. Their durability and the slight (but noticeable) boost they give your car's performance make them worth the extra money.

OVER? BEARING

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LETTERS

(Continued from page 74)

packs; it's just that I want to know exactly what goes into the packs that I use to race. Have you ever written an article on how to construct battery packs?

I race with an Ultima II, but I've considered buying an Associated RC10 Champ car. Why is it so popular? What does it have that other cars don't?

CHARLES FILTZ
Schofield, WI

Charles, to learn how to assemble battery packs, check out Steve Pond's "Battery Assembly Basics" article in the July '91 issue.

The RC10's success can be attributed to many things—durability, racing performance, the availability of hop-up parts. If its success could be pinned down to one feature, don't you think that someone would have created a better version?

AS

BROKEN STARTER BLUES

I received a Rampage GP-10 for Christmas. About a month later, my recoil-

(Continued on page 103)



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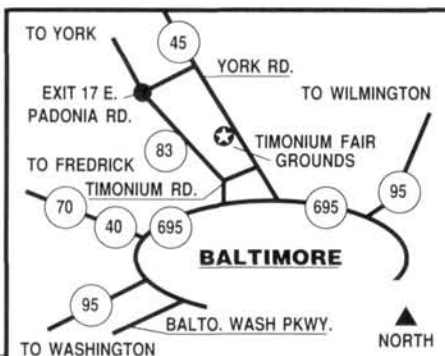
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AS ALWAYS
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1 9 9 1 NR/CTPA WORLDS

THE HEAVIEST SHOW ON EARTH

by DAVE SPROUL

THEY CAME, they saw, they conquered! Well, not everyone conquered, but they came and saw and had a good time. R/C pullers and monster truck racers from all over the U.S. and Canada converged on the Tippicanoe County Fairgrounds in Lafayette, IN, on September 21 and 22, 1991, for what has become known as "The Heaviest R/C Show on Earth"—and rightfully so! These men and women moved a collective 2,716 pounds with their massive machines! I think you'll agree that a 25-pound truck pulling more than 400 pounds is pretty impressive.

As former president of the National Radio/Controlled Truck Pulling Association (NR/CTPA), I organized and directed the



Larry Papi's (of Sassy Chassis) SST Bullhead.

two previous championship events, so I know how much hard work it entails. I must congratulate current NR/CTPA President Mark McFadden and his assistants on a job well done. The show ran smoothly, and the competitors seemed to enjoy themselves.

R/C manufacturers set up dis-



"I tawt I taw a putty tat."

1991 NR/CTPA World Championships Results

2WD STOCK

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Paul Levecchia	Belleville, NJ	Grasshopper II	Kyosho Mega 360	Novak	29' 6"	63
2	Margaret Brockman	Arnella, OH	n/a	B&R	Robart	25' 6.5"	63
3	Phil Grenier	Cameron, MO	Blackfoot	Kyosho Mega 360	Futaba	21'	63
4	Scott Specht	Cowlesville, NY	Raider	Kyosho Mega 360	Robart	20' 9.5"	63
5	Joe Kilian	Wahanak, NY	Blackfoot	LeMans	Kyosho	13' 7.5"	63

2WD SUPER STOCK

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Paul Levecchia	Belleville, NJ	Hi-Rider Vette	Kyosho Mega 360	Novak	17' 3"	123
2	Chad Whitacre	Laura, OH	Traxxas	n/a	Zeta	Full	93
3	James Bee	Cincinnati, OH	n/a	Parma	Zeta	Full	93
4	Scott Specht	Cowlesville, NY	Big Boss	360 ST	Robart	25' 9.5"	93
5	Jay Price	Milner, GA	Big Brute	240 ST	Scratch	22'	93

2WD MODIFIED

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	James Hoskins	Brookville, IN	Parma Sport	Parma	Zeta	27' 3.75"	163
2	Brian Shafraneck	N. Royalton, OH	Parma Sport	Parma	Zeta	21' 9"	163
3	James Bee	Cincinnati, OH	n/a	Parma	Zeta	Full	133
4	Paul Levecchia	Belleville, NJ	Cobra	Astro Flight	Novak	28' 4"	133
5	Dutch Esagro	Ebensburg, PA	Blackfoot	Triad	Astro Flight	26' 4"	133

NR/CTPA WORLDS

play booths and peddled their wares to approximately 300 entrants. Also, the Ohio Fuel Pullers Club demonstrated its incredible 1/10- and 1/6-scale fuel-powered pullers—neat stuff!

Here are some of the highlights:

- Paul Levecchia won the 2WD Stock and 2WD Super Stock Classes, the former with an incredible 29 1/2-foot pull.
- With more than 60 entries, the 2WD Sportsman Class was definitely the most popular.



Some of the hottest R/C trucks in the country competed in Sunday's Concourse event. John Beecher's Wayne Rausch replica captured the "Most Realistic Puller" award.

- The top three finishers in the 2WD Open I Class pulled a total of 340 pounds. The wild, 2WD Open II Class topped this by 79 pounds!

- The 4WD classes didn't seem to attract the interest that the 2WD classes did. There were just two competitors in 4WD Stock and only one each in 4WD Modified and 4WD Super Stock Monster Truck. There were two entries in the 4WD Sportsman Class, but this may be because it's new.

- The Dual-Motor Class drew almost 30 entries and was flooded with mean Clod Busters.

- More than 40 machines tackled a drag-race-style obstacle course for the fast and furious Monster Truck Racing event.

- Many of the Clod Busters in the very popular Monster Truck class used high-tech, multi-link

HOOTERVILLE EXPRESS!

How do you know when people are serious about R/C? I think that the members of the Hooterville Pulling Team are pretty serious. They have a bus—really—a bus—that's complete with toolboxes, storage areas and a 10-foot pulling track inside. Believe it! All seriousness aside, the Hooterville bunch is a great group of people who take their pulling seriously and know how to have fun while they do it. The "Hooters" kindly allowed me to photograph them with the bus, probably because I promised them fame and fortune—well, fame, anyway! If you plan to pull in the Pennsylvania/Ohio area, watch out for the Hooterville Pullers; they mean business. You should also consider yourselves forewarned: the Hooterville Express isn't afraid to take to the road for out-of-state events. One thing's for sure: you won't find a nicer bunch!



Be on the lookout for the Hooterville Pulling Team's bus. It's equipped with tools and a 10-foot pulling track.



The ugliest monster truck belongs to Jerri Moss of Lebanon, IN. Jerri knows how to define ugly!

2WD SPORTSMAN

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Jack Koogler	Xenia, OH	Beeliever	Parma	Zeta	Full	153
2	Joe Haynes	Edwardsburg, MI	Scratch-built	Kyosho 360	Zeta	28' 11.5"	153
3	Tim Fry	Akron, OH	Scratch-built	360 ST	Novak	28' 11"	153
4	Steve Van Dyke	Grand Rapids, MI	Beeliever	n/a	Zeta	28' 5"	153
5	Randy Shoaf	Decatur, IL	Scratch-built	360 2S	Swing arm	27' 6.5"	153

2WD OPEN I

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Marcia Arman	Dorr, MI	Beeliever	n/a	Zeta	22' 8"	340
2	James Bee	Cincinnati, OH	Beeliever	Parma	Zeta	20' 10.5"	340
3	Kyle Haynes	Edwardsburg, MI	Scratch-built	Astro Flight	Zeta	20' 7.75"	340
4	Larry Edwards	Cambridge Springs	Beeliever	Astro Flight	Astro Flight	28' 9.25"	267
5	Joe Kirkwood	Indianapolis, IN	Pro Puller	Graupner	Zeta	27' 9.75"	267

2WD OPEN II

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	James Bee	Cincinnati, OH	Beeliever	n/a	Zeta	28' 6"	419
2	Terry McLane	St. Clair, MI	n/a	Astro Flight	n/a	26' 5.5"	419
3	John Dyck	Welland, Ontario	Scratch-built	Astro Flight	Astro Flight	26'	419
4	Glen Singleton	Utica, PA	Scratch-built	n/a	Zeta	20' 9.5"	419
5	Tim Fry	Akron, OH	Scratch-built	Astro Flight	Zeta	20' 7.5"	419

CONCOURS • CONCOURS • CONCOURS • CONCOURS • CONCOURS

CATEGORY	AWARD	NAME, CITY/STATE	TRUCK
PULLERS	1st	Mike Dechiaro, Queens, NY	Little Hooker Wrecker
	2nd	Rusty Graves, Clinton, IL	n/a
	3rd	Rick Klonowski, Manassas, VA	Dixie Hustler
	Most Realistic	John Beecher III, Lafayette, IN	Wayne Rausch Model T Replica
	Ugly Truck	Greg Kinsey, Lasalle, MI	n/a
MONSTERS	1st	John Beecher III, Lafayette, IN	Gravedigger
	2nd	Jack Wright, Winston-Salem, SC	Clod Buster
	3rd	Mike Guertin, Hubbardston, MA	Gravedigger
	Most Realistic	Mike Guertin, Hubbardston, MA	Gravedigger
	Ugly Truck	Jerri Moss, Lebanon, IN	n/a
LONG-DISTANCE		Bryan Bahlmann, Encinitas, CA	n/a



Mike Guertin's Gravedigger won the "Most Realistic Monster" award.

dissuspensions, and a couple of trucks were totally scratch-built! The winner was a four-link, cantilever-equipped Clod. (I finished a poor 10th place—fast truck, lousy driving! Oh well, there's always '92!)

Although the event's attendance was down slightly from

1990, it was still impressive. The ingenuity of the people in the pits, and the innovations on the pullers and the monster trucks were incredible. It's part of what makes this sport so much fun.

1991 NR/CTPA World Championships Results (cont.)

4WD STOCK

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Brad Pitt	West Chicago, IL	Optima Mid	Kyosho 360 ST	Futaba	21' 2"	63
2	Kevin Loomis	West Chicago, IL	Yokomo	Kyosho 360	Novak	5' 1.5"	63

4WD MODIFIED

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	John Walters	McPherson, KS	Bruiser	Astro Flight	Novak	Full	73

4WD SPORTSMAN

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	John Walters	McPherson, KS	n/a	Revtech	Scratch	28' 3"	153
2	Todd Eckelberg	Green Bay, WI	Scratch-built	Graupner	Zeta	16' 5"	153

4WD OPEN I

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Duane Landheer	Grand Rapids, MI	Scratch-built	n/a	n/a	24' 5"	340
2	James Bee	Cincinnati, OH	Beeliever	Parma	Zeta	21' 2"	340
3	Jack Koogler	Xenia, OH	Beeliever	Astro Flight	Zeta	29' 5.25"	267
4	Ted Dezzaan	Wyoming, MI	Scratch-built	Astro Flight	Zeta	29' 5"	267
5	John Walters	McPherson, KS	n/a	Astro Flight	Scratch	28' 8.75"	267

4WD OPEN II

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Jerome Rosengren	Lino Lakes, MI	Scratch-built	Astro Flight	Novak	27' 2"	419
2	Dale Arman	Dorr, MI	n/a	n/a	Zeta	25' 4.75"	419
3	Larry Bennett	Romney, IN	Pro Puller	Fire Fox	Zeta	24' 7.25"	419
4	Dale Arman	Dorr, MI	Beeliever	n/a	Zeta	19' 3.25"	419
5	John Walters	McPherson, KS	Scratch-built	Graupner	Parma	27' 3.25"	359

DUAL-MOTOR STOCK

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Roy Allen, Jr.	Bonneau, SC	Clod Buster	Mega 360	Stock	Full	143
2	Matt Wilkins	Grand Rapids, MI	Clod Buster	n/a	Zeta	25' 5.5"	143
3	Rob Choinski	Big Bend, WI	Clod Buster	Kyosho Mega 36	Robart	25' 1"	143
4	Ed Kramer, Jr.	Fairfield, NJ	Clod Buster	Kyosho Lemans	Novak	23' 11.5"	143
5	Kevin Loomis	West Chicago, IL	Clod Buster	Kyosho 360	Novak	21' 7"	143

DUAL-MOTOR MODIFIED

Pos.	Name	City/State	Truck	Motor	ESC	Distance	Weight
1	Roy Allen, Jr.	Bonneau, SC	Clod Buster	Pro Puller	Scratch	21' 3.5"	264
2	Brad Pitt	West Chicago, IL	Clod Buster	Astro Flight	Tekin	20' 6.25"	264
3	William Papas	Hudson, NH	Clod Buster	Astro Flight	Zeta	19' 7"	264
4	Rob Choinski	Big Bend, WI	Clod Buster	Astro Flight	Robart	18' 9.75"	264
5	John Norcross, Jr.	Gardner, MA	Clod Buster	Astro Flight	Astro Flight	28' 9.25"	215

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Rick Klonowski's Dixie Hustler grabbed the 3rd-place Concourse trophy. Good job, Rick!



This 1/6-scale Astro Van impressed everyone during its demonstration. It's powered by twin, 2-stroke engines.

Creativity is high at these events. You have to see it to believe it. Rumor has it that this year's event may take place in conjunction with a major full-scale truck show in the Midwest. Make plans now to attend; you won't be disappointed.

2WD STOCK MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Becky Daniels	Schenectady, NY	Traxxas Hawk	AJ's R/C	Tekin	3.29
2	Jerri Moss	Lebanon, IN	Monster Beetle	Peak Performance	Novak	3.69
3	John Beecher III	Lafayette, IN	Blackfoot	Stock	Stock	4.01
4	Dennis McCarthy	Lee's Summit, MO	Big Brute	B&R Bullet	Traxxas	4.08
5	Brian Nalker	Des Plaines, IL	Big Boss	Kyosho	Stock	4.64

2WD SUPER STOCK MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Ed Avery	Willington, CT	Losi JR-XT	B&R Bullet	Novak	2.79
2	Jim Winter	West Allis, WI	RC10 Conv.	B&R Sport	Zeta	3.26
3	Allan Hood	Schenectady, NY	Losi JR-XT	AJ's R/C	Novak	3.31
4	Vincent Gamache	Willimantic, CT	King Cab	Stock	Novak	3.40
5	Ron Walls	Ladoga, IN	JR-XT	B&R	Novak	3.65

2WD MODIFIED MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Larry Papi	Cary, IL	Big Brute	Fantom	Novak	3.09
2	Gregg Pierce	Bourbonnais, IL	Blackfoot	Kyosho Mega 16D	Novak	4.25
3	Bruce Kaufman	Lino Lakes, MN	Blackfoot	Trinity	n/a	4.68
4	Brian Nalker	Des Plaines, IL	Blackfoot	Black Magic	Novak	6.54

4WD STOCK MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Brian McGuire	Amelia, OH	Clod Buster	B&R	Stock	3.51
2	John Stokes	Tuscola, IL	USA-1	Kyosho 360 Mega	Novak	4.10
3	Vincent Gamache	Willimantic, CT	Clod Buster	Trinity	Tekin	6.22
4	Andrew Dixon	Lebanon, IN	Clod Buster	Stock	Stock	9.40
5	Edwin Velazquez, Jr.	Maspeth, NY	Bull Head	Trinity	Novak	10.9

4WD SUPER STOCK MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Michael Shaw	St. Joseph, IL	Lazer Conv.	Kyosho	Novak	5.05

4WD MODIFIED MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Brian Turner	Kentwood, MI	Clod Buster	Trinity	Novak	3.38
2	Joe Kirkwood	Indianapolis, IN	Clod Buster	n/a	Zeta	3.49
3	Jack Wright	Winston-Salem, NC	n/a	Parma	Zeta	3.71
4	Joe Kirkwood	Indianapolis, IN	Clod Buster	Black Magic	Zeta	3.83
5	Ron Walls	Ladoga, IN	Clod Buster	Trinity	Zeta	3.84

OPEN-CLASS MONSTER TRUCKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Paul Raines	Baitio, CT	JR-XT	Paragon	Tekin	2.68
2	Ed Avery	Willington, CT	JR-XT	B&R Bullet	Novak	2.79
3	Alan Luper	Lebanon, IN	JR-XT	Pocket Rocket	Novak	3.16
4	Michael Shaw	St. Joseph, IL	Lazer Conv.	Kyosho	Novak	3.40
5	Bob Pierce	Bourbonnais, IL	Optima Mid Conv.	Pocket Rocket	Novak	4.53

MONSTER TANKS

Pos.	Name	City/State	Truck	Motor	ESC	Time
1	Mark Fernando	Milwaukee, WI	Blizzard	Monster Mash	Zeta	3.26
2	John Stokes	Tuscola, IL	n/a	Kyosho	Novak	14.63

On-Road Nationals



These two pit women are placing no. 2 (for Mace Horowitz) and no. 4 (for Eric Vasutin). Every driver should have such a pit crew.

by MIKE LEE

CALIFORNIA IS known for many things. To some, it's gold country; to others, it's the land of sunshine and citrus. To R/C racers, however, it's the home of on-road asphalt racing. In August 1991, NORRCA held its On-Road Nationals at the famous Ranch Pit Stop raceway in Pomona, CA.

More than 150 cars battled it out for three days in the blistering California sun; and I do mean *blistering*! Temperatures on the first day of qualifying hit 110 degrees, and this had a pronounced effect on batteries, motors and drivers. I found out how hot the track was when I handled my teammate's car: after a 4-minute run, the chassis was almost too hot

to touch. The phrase of the weekend was, "Cool out."

Not only did Andy Jacobsen of Andy's R/C Products sponsor this event, but he also participated in the 1/10- and 1/12-Scale Modified Classes. Running the show for NORRCA

"More than 150 cars battled it out for three days in the blistering California sun..."

was the "big man," NORRCA president J.R. Sitman. J.R. also got into the fun with an entry in the Pro-Stock Class. Notably absent were the Associated, Losi and Trinity factory teams. Notably present were the Peak Performance factory team, the Bolink Racing team,

Endurance Racing team members and the Advanced Racing Technology team.

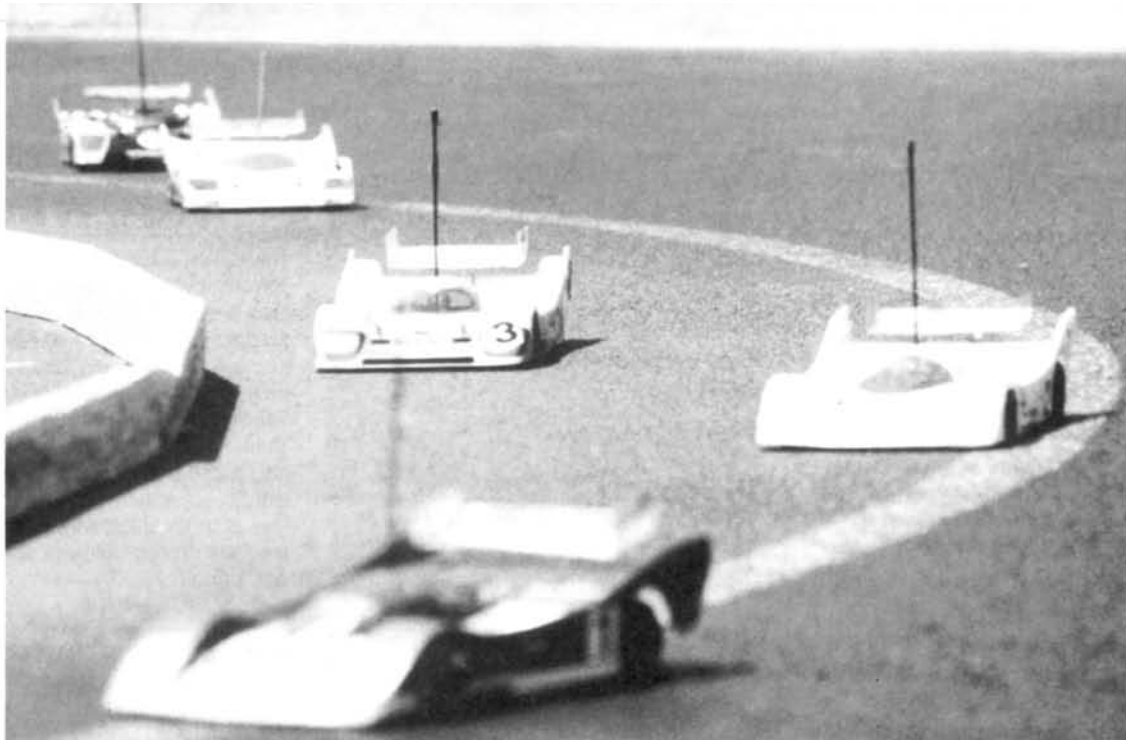
QUALIFYING

Qualifying got under way on Friday, August 23, and the first guys on the track were the luckiest ones: the weather was fairly cool, and they could run with hot motors. By 11 a.m., the temperature had reached 100 degrees, and the heat pounded the batteries—time for the conservative motors. How conservative were they? Several drivers in 1/12-Scale Modified ran stock-class motors to ensure that they made the 8-minute time, and they achieved competitive runs.

A good qualifying run in the 1/10-Scale Modified Class meant coming up with a motor



Rounding turn one, Belair leads Rick Hohwart while Ron Schuur looks inside for the move. Schuur made it later on, and it stuck for good when Belair faltered and Hohwart got high sided on a corner dot.



and battery combination that would last 18 laps. (This was considered a good run when the weather was cool.) Fernando Belair led the pace with 18 laps, followed by Ron Schuur, Rick Hohwart and Frank Killam. Hohwart held the track record. The 1/10-Scale Pro-Stockers had their hands

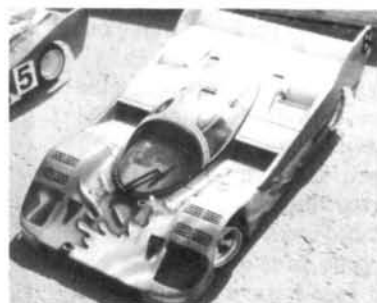
the Direct Drive Stock Class, the handout motors hummed away. Joe Hawkins and Bob Rau posted fast 16-lap runs to capture the top spots, but the entire field was only a few seconds behind. That's what stock-class racing is all about.

CONCOURS

Always a popular event, the Concours competition took place on Sunday morning. I'm glad I'm not a concours judge, because the quality of the cars has become so high that it's tough to choose a winner. It used to be easy; there were few people who could paint well! Now, everyone has become a great "artiste," painting his brains out and producing bodies that really shouldn't be used on race cars; they should be on display!

A Nissan NPT 90 GTP by D.J. Renwick of Hemet, CA, won 1st prize. It had an Associated 10L chassis and Tecnacraft rims. Believe me, pictures do *not* do D.J.'s car justice. Second place went to George Agard's Lowenbrau Porsche 962. George, who's from Pleasantown, CA, also uses an Associated 10L with Technacraft rims. Carlo Bruno took 3rd with a Lotec BMW from Andy's. The body is

The picture doesn't do this "splashed" Porsche 962 justice. Paint jobs such as this one make judging concours events extremely difficult.



A track marshal watches no. 3 plow under another car in turn two.



Despite the blistering 100-plus-degree temperature, Fernando Belair ripped the track wide open.

full, with top track times being reached in the 17-lap range. Paul Smith and Ed Correa led this class all weekend.

In the 1/12-Scale Modified Class, David Berger set the time to beat. His grip on the TQ position was unrelenting. As soon as another driver posted a faster time, Berger would blow it away. He posted a 35-lap qualifying time that remained untouched. In

NORCCA

mated with yet another Associated 10L; it has TKM rims and the ever-present truck and trailer for which Carlo is now famous.

1/10-SCALE DIRECT-DRIVE MODIFIED A-MAIN

The day before the Mains, NORCCA held its Trophy Dash for the top four qualifiers from each class. It was a sign of things to come—a *big* sign! Schuur won the race hands down over Belair, Killam and Hohwart. It was a big surprise, because Schuur was the 3rd-place qualifier, and TQer Belair had set a new track record with a scorching 19 laps in 4:10. Although the runs in the Trophy Dash are only half as long as the heats and the Mains, the race sent a message to the field: watch out for Schuur!

In the Main, Belair was on the pole with Hohwart alongside. The first lap was quick, and Belair got beamed going into turn three. Hohwart bided his time, but he stretched out a little too much in the same turn and left his car high-sided on a corner dot. Schuur and Killam took the lead. Schuur grabbed on for the long haul; the rest of the field found him waiting at the finish line with the checkered flag in hand. Meanwhile, Belair moved through the pack, where he found a very tough Killam holding on to 2nd place. The fight between the two lasted for the rest of the race. Belair took 2nd and Killam had to settle for 3rd. Belair and Schuur chalked their wins up to old age and experience. There's hope for us older guys yet, eh, Fernando?

1/10-SCALE DIRECT-DRIVE PRO-STOCK A-MAIN

As I mentioned earlier, Smith dominated this class. His car was very fast, and he really never abused it. It paid off in the Main, as Smith left the line cleanly and was gone. There was only opportunity to compete for the 2nd and 3rd spots. Rob Press, Correa and Chris Walrod did their thing, putting on a real show for the crowd.

(Continued on page 145)



J.R. Sitman watches while Dave Cleveland gets a "hose job" from Andy Jacobsen and Rob Press. This was part of winning the Team Cup Championship, and Dave deserved it...the dunking, that is.

Wet Winner

The NORCCA Nationals Team Cup Championship involves four-man teams. Two of each team's drivers must be entered in modified events, the other two in stock events. The number of points awarded is based on each driver's finish in the qualifying and the Mains. The NORCCA Team Cup Championship went to Team Endurance Racing for its efforts, which put drivers in a few A-Main events. Dave Cleveland accepted the award—and a soaking, courtesy of Andy Jacobsen and company. Dave recovered nicely, and I'm sure he thought it was worth it.

1/10-SCALE DIRECT-DRIVE MODIFIED A-MAIN

Fin.	Qual.	Name	Laps
1	3	Ron Schuur	18
2	1	Fernando Belair	18
3	4	Frank Killam	18
4	10	Rob Press	17
5	7	Doug Doss	17
6	8	Dominic Sellers	17
7	9	Ed Correa	17
8	2	Rick Hohwart	16
9	5	David Berger	16
10	6	Bill Bowerman	16

1/10-SCALE DIRECT-DRIVE STOCK A-MAIN

Fin.	Qual.	Name	Laps
1	10	C.J. Einspahr	16
2	4	Dennis Ariga	16
3	1	Joseph Hawkins	16
4	7	Nick Abdelnour	16
5	2	Bob Rau	16
6	3	Chris Verano	15
7	8	Carlo Bruno	15
8	9	Don Gilliland	15
9	6	David Lang	14
10	5	Eddie Wooley	8



From left: Dave Berger, C. J. Einspahr, Andy Jacobsen, Paul Smith, J.R. Sitman, Billy Bowerman, Ron Schuur.

1/10-SCALE DIRECT-DRIVE PRO-STOCK A-MAIN

Fin.	Qual.	Name	Laps
1	1	Paul Smith	17
2	3	Rob Press	16
3	2	Ed Correa	16
4	5	Chris Walrod	16
5	9	Mike Chavez	16
6	8	Brian Rutherford	16
7	10	Bryan Peterson	16
8	6	Dominic Sellers	16
9	7	Jim Kimura	16
10	4	Bill Martin	9

1/12-SCALE MODIFIED A-MAIN

Fin.	Qual.	Name	Laps
1	1	David Berger	33
2	3	Frank Killam	33
3	4	Eric Vasutin	33
4	5	Billy Bowerman	33
5	2	Mace Horowitz	33
6	8	Chuck vanDerweghe	32
7	6	Mike Skube	32
8	9	Shad Smith	32
9	10	Jim Walls	25
10	7	Butch Feco	7

ASSOCIATED

RC

10 TEAM CAR

by JOHN HUBER

IT WAS really tough to pick the car of the year. Of all the 2WD cars offered, we could only choose one! We slugged it out for a while, and we finally agreed on the RC10 Team Car because of its great new features and its race performance so far this year.

After Team Losi introduced its JRX-Pro, the number of people who raced RC10s seemed to diminish. Then it happened; Team Associated released its secret weapon. Associated's

Team Car is the new version of the RC10; it has been updated

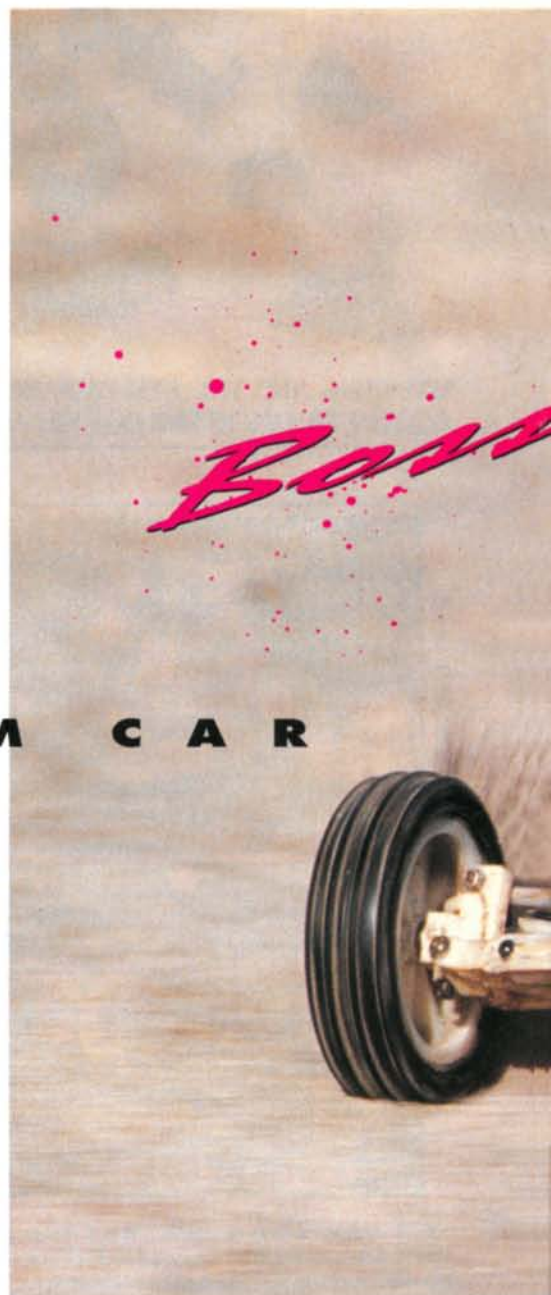
with the famous Stealth transmission, a slipper clutch, Team shocks and a host of other features that make it our choice for the '92 2WD Car of the Year. Let's take a look at what this car has to offer.

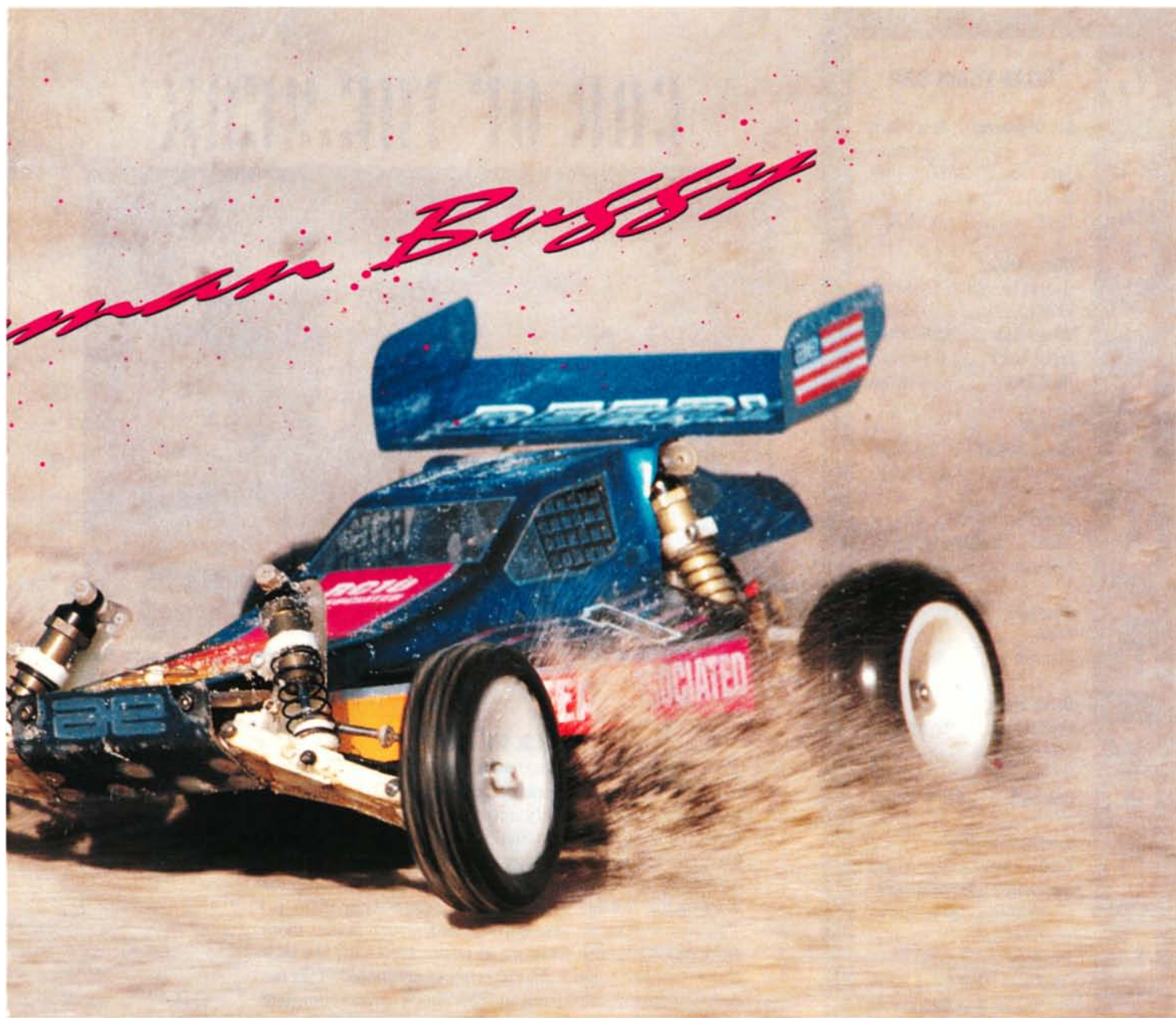
Radio Control
CAR ACTION



PHOTOS BY STEVE POND

CAR OF





The Team Car's most significant improvement has to be the Stealth transmission. This effective, 48-pitch transmission replaces the original 32-pitch version. Like the MIP design, it uses three gears to de-

liver the power rather than the original design's six. The differential is in the final stage of the Stealth transmission, unlike the original's primary-stage diff. This allows the diff to stay clean longer (because it's

inside the tranny) and to operate more smoothly. Compared with the original tranny, the Stealth is lighter, more compact and much more efficient.

THE TEAM CAR

RC10 TEAM CAR

Manufacturer .. Associated
Electrics
Type 2WD off-road
Scale 1/10
Price \$305*

Dimensions:

Overall Length ... 15 inches
Width 9 inches
Wheelbase 10.5 inches
Front Track 8.5 inches
Rear Track 8 inches

Weight:

Gross (w/bat.) 3pounds,
6.4 ounces

Body:

Type Single-seat buggy
Material Polycarbonate

Chassis:

Type Tub
Material Aluminum

Drive Train:

Primary Pinion/spur
Transmission Gear
Differential Ball diff
Bearings Ball bearings

Suspension (f/r):

Type .. Independent A-arm
Damping Oil-filled, coil-
over shocks

Wheels:

Front One-piece nylon
2.1x.625 inches
Rear One-piece nylon
2.1x1.25 inches

Tires:

Front TQ-72 ribbed
Rear TQ-22 mini-spikes

Victories:

Reedy Race of Champions,
'90, '91, '92; ROAR Off-Road
Nats, 1990; Japanese Nat'l
Champion, '90, '91; ROAR
Winter Championship, '91,
'92; European Champ-
ionship, '91; British Nat'l
Championship, '91.

*Kit is also available with a graphite
chassis for \$345.

CAR OF THE YEAR



From left: Roger Curtis, Cliff Lett, Curtis and Gene Husting accept the trophy for 1992 Car of the Year.

SHOCK ME BABY

The car also features Associated's new Team shocks. They have the same dimensions as the original gold shocks, but they've been completely redesigned for better performance. The seals are installed from the inside of the shock body, rather than the outside. This makes assembly easier and eliminates the need for special tools. (You just load the seals on the tool that's included in the kit, and pop them in.) The new shocks are also hard-coated, which makes them smoother and more resistant to wear. Up front, .71-inch shocks are used, and 1.32-inch shocks are included for the rear suspension. New front and rear shock towers complete the Team setup.

OTHER GOODIES

You can spot the Team Car right away! Rather than the RC10's trademark gold chassis, the Team Car has a new, black-anodized chassis. (A graphite version is also available.) There are also several new features that aren't quite as visible. Up front, the Team Car has longer A-arms and a set of in-line steering blocks. In the rear, Associated added its universal drive shafts and increased the toe-in to 3 degrees. Turnbuckle tie rods are standard equipment, as they should be on any competition-quality car. Add the kit's lightweight TQ rims and the Viper body, and it's one nice lookin' vehicle. Congratulations, Team Associated, from all of us at *Radio Control Car Action*!

**Here's the address of the company featured in this article:*

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626. ■

LETTERS

(Continued from page 82)

starter assembly broke. Where can I buy a new one? I tried most of the places advertised in your mag, but all of them had the part on back order. I really need one fast. Keep up the good work.

JAMEY LONGMEYER
Arvada, CO

Jamey, to order a new recoil starter, try contacting Tower Hobbies, P.O. Box 9078, Champaign, IL 61826-9078; 800-637-6050. AS

4WD IS ALIVE

What has happened to 4WD? I've wanted a YZ-10 since I started to race, and I finally got one, but now I can't find anywhere to race it. There are tracks near me, but there aren't any 4WD classes for me to race in.

I loved your "Track Report" on the new '91 Works YZ-10. Can you help me get the message out that 4WD cars are just as good as 2WD cars—sometimes even better? Also, can you do an article on the Lazer that Mike Dunn used to win the '91 Nats? Thanks a lot.

KEITH GILBERT
Loganville, CA

In my opinion, Keith, 4WD is one of the most exciting racing classes. Not only are 4WD cars faster, but they also handle better and are easier to drive! I think that 4WD isn't as popular as other classes because none of the major American manufacturers offers 4WD cars. All the 4WD cars that are currently available come from Japan or Europe, making parts expensive and difficult to find. In Europe and Japan, 4WD is the most popular class—it really should be popular here, too.

For an in-depth look at Mike Dunn's Lazer, check out the April '92 issue. AS

(Continued on page 166)

NISSAN SKYLINE

(Continued from page 80)

Trinity's* 16-turn, double-wind Gargantua, which provides sufficient torque to pull all four wheels.

BODY PAINTING & DETAILING

I wasn't looking forward to painting the car. (My airbrush was broken, so I had use spray cans.) I decided to stick with the box-

(Continued on page 115)



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#4764 STEALTH Concave Thrust Washer Kit

#4760 STEALTH Gear Set 64 Pitch (machined)

#5310 TRAXXAS Hub & Axle Set

#5315 Turnbuckle Kit (4-2", 2-1 5/8", 2-11/4")

#4713 Turnbuckle Steering Kit

#4946 Aluminum Support Bracket (Center Gear)

#4680 ULTIMA Gear Set 48 Pitch Final Pinion & Diff.

#5302 Idle Gear Set Hard anodized aluminum

#4682 ULTIMA 48 Pitch Final Pinion Hard - Anodized Aluminum



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NITRO NEWS

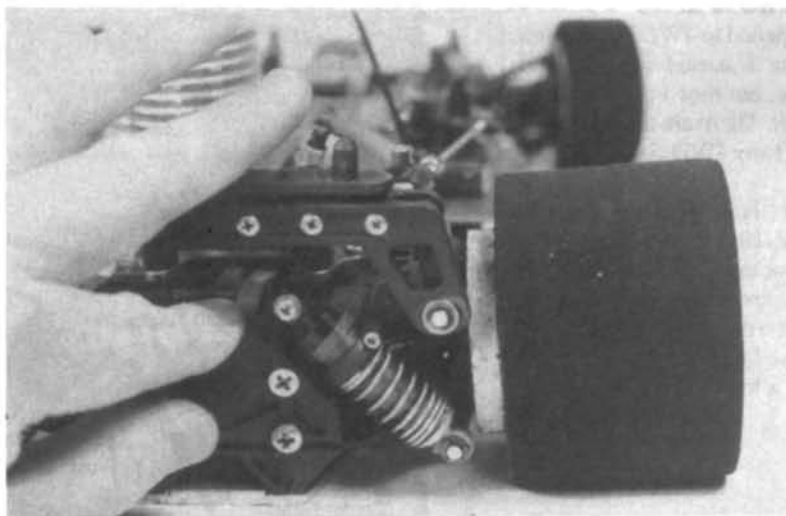
by JEFF BRONSTEIN

Suspension Shock?! Part I — In Traction

GAS RACERS deal with some of the most sophisticated full-suspension systems in R/C racing, and every racer could learn some valuable tips from the nitro set.

As a race car negotiates a curve, it's delicately balanced according to the laws of physics. Using a combination of inertia, friction, energy and aerodynamics, a car's suspension geometry keeps it in contact with the road. In most cases, an average racer with a properly tuned car will outperform a more experienced racer with a poorly tuned car.

Countless long-winded, technical volumes have been written on the subject, but the most important points can be boiled down to a few basic principles. To avoid "suspension shock" you should understand the basics of chassis and suspension design and how they affect a car's performance. Whether your car has full suspension or is a pan car, if you pay attention to suspension, you'll find racing a lot more fun—and a lot less frustrating. (Caster, camber, etc., are all suspension adjustments.)



This racing car has negative camber. Zero camber is when the tires are exactly vertical. Camber is always measured from vertical. It's important that a tire not lean with the chassis when the car corners, or the camber will change. Keeping camber near zero under all conditions would be ideal.

COMMON SENSE

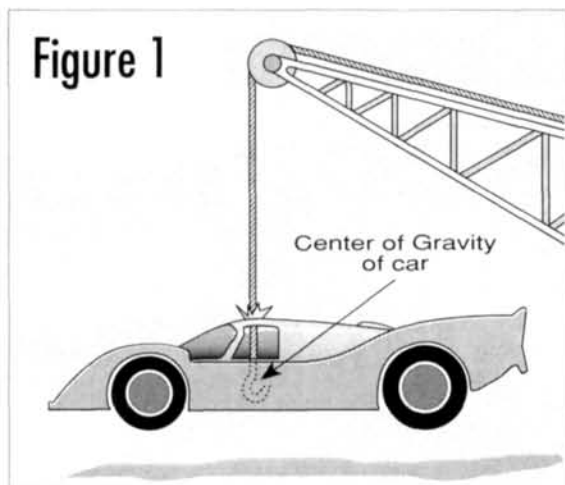
The most important design rule is more common sense than scientific principle: all other factors being equal, a light car will corner faster than a heavy car. Try to steer a full grocery cart around a corner in the supermarket; then try it with an empty one. With a lighter car, there's less overall traction, because there's less weight pressing the tires onto the track. This also means that there's less inertia in the corners, however, so the car will have to lose less time "scrubbing" (slowing down) to change direction. Traction is the adhesion, or friction, of an object, say a tire, to the surface over which it moves. If a race car's speed is too great

for its tire traction, the car will spin or slide. Therefore, the main objective of any designer (or re-designer) is always to reduce a car's weight as much as possible—to the allowable minimum.

WEIGHT WATCHING

The way in which a race car's weight is distributed is as important as its total weight. We're talking about a car's *center of gravity* or *CG*—the point from which the car will hang balanced, if not affected by any outside force. On either side of any line that intercepts the CG, there will be equal weight, *but not necessarily equal mass*, i.e., the CG *might not* be in the center of the car. A car with a low center of gravity, i.e., with its weight concentrated at a low, central point, will be able to corner faster than a car with a high CG (again, all other factors being equal).

Ideally, a car's components should be arranged so that the CG is as low as



Theoretically, if you could suspend a car from its center of gravity (CG), it would hang perfectly balanced, and it would stay balanced even if it were rotated.

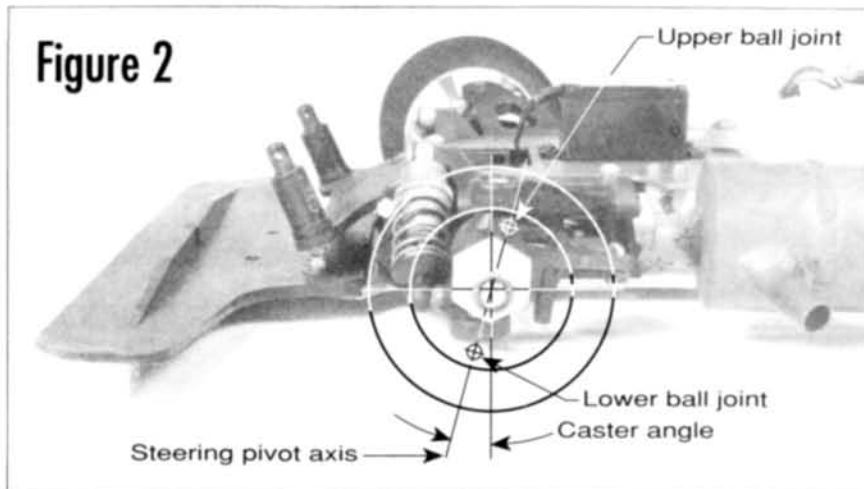
possible on the chassis. During cornering, the weight load "shifts" to the outside wheels; traction on these wheels *increases*, while traction on the *inside* wheels *decreases*. The increased traction on the outside tires doesn't offset the reduction in traction on the inside tires, however; there's a *net decrease* in traction. Although the receiver, the radio and other components weigh very little, the force of cornering magnifies their weight, and the higher they are, the more pressure they'll exert on the chassis. This pressure is always greatest where the tires touch the ground, so a lower CG will allow the car to corner faster and resist roll-over (which is caused by lateral weight transfer).

You can also lower the CG by reducing the car's ride height, i.e., lowering the chassis.

Adding springs or flex plates and shocks or friction dampers allows the car to roll or lean, and this leads to more problems. A car's weight should be equally distributed between its left and right along its center line. As weight is transferred from side to side, a car will pivot around its roll center. It's often difficult to center a race car's weight because the engine can't be moved closer to the center line. If this is the case, add weight to the side that's opposite the engine. If weight is balanced along the center line, both sides of the car will react in the same way, and the car will track straight when accelerating.

Most tracks aren't straight, and the po-

Figure 2



"Caster" refers to the angle between the steering pivot axis and a vertical reference point. Positive caster (where the upper end of the steering pivot axis is tilted toward the rear of the car) is illustrated here. Most cars have positive caster.

sition of each wheel changes as the car negotiates a curve or a bump. As the chassis shifts, the angle between the tires and the road (i.e., camber) alters and traction is reduced. To compensate for chassis roll, the suspension must be tuned to move *with* the chassis. Most cars can be tuned so that the negative effects of chassis roll will be reduced. Maximum traction occurs when the tires stay squarely on the track. The greater the tire area on the road, the greater the traction. Larger tires can improve cornering, but they also encounter more drag (rolling resistance) because they touch more of the track. For the best performance, the suspension and chassis must maximize their use of the area that's in contact with the track.

CAMBER

Camber refers to the angle at which the wheels lean from vertical (viewing the car from in front or behind).

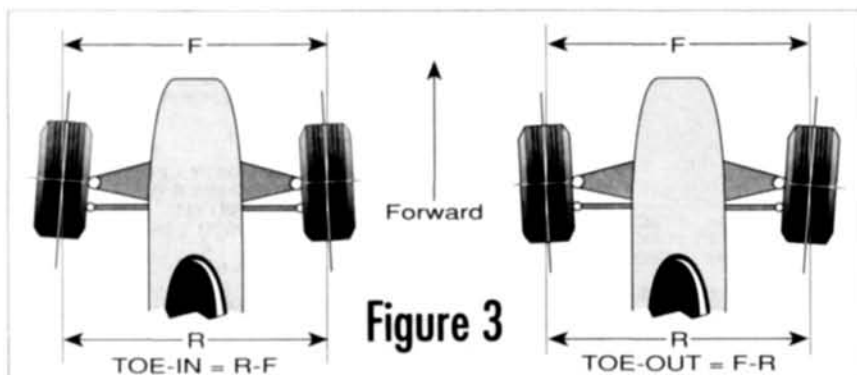


Figure 3

"Toe-in" and "toe-out" refer to the angle set between the paths of the left and right tires. Zero toe occurs when both tires point in exactly the same direction (i.e., their paths would never cross).

- Zero camber means that a wheel is exactly vertical, and its tire has as much of its surface area as possible touching the running surface.
- Positive camber means that the top of a wheel is leaning away from the center of the car.
- Negative camber means that the top of a wheel is leaning inward, toward the center of a car.

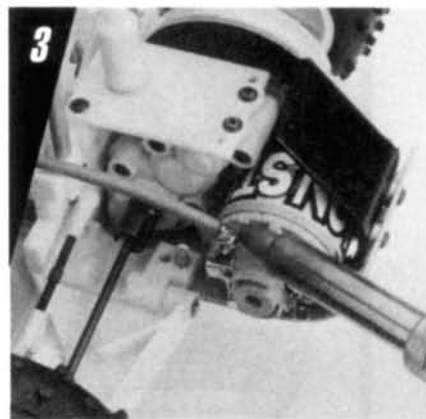
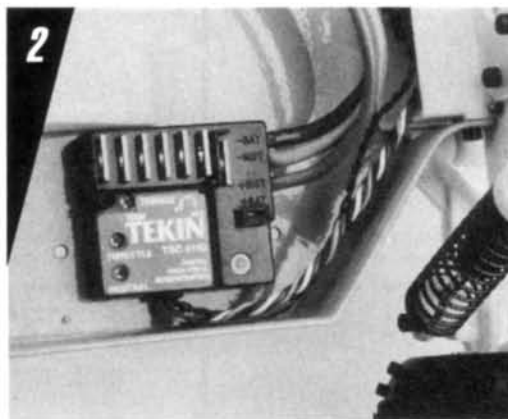
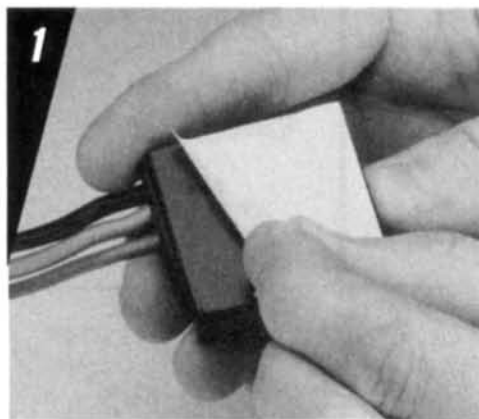
For most applications (and maximum traction), camber should be adjusted to a nearly neutral (or slightly negative) setting throughout the suspension's range of travel.

CASTER

If you look at the car from the side and imagine there's a line drawn through the steering kingpin, "caster" refers to the angle between that line and an imaginary vertical reference line. Vertical is neutral. Positive camber exists when the tops of the kingpins tilt rearward. When the wheel turns, caster keeps it perpendicular to the ground; this maximizes traction and negates the effects of chassis roll. Caster also generates a force that tends to return the wheel to its neutral (vertical) position and allow the car to track straight.

Off-road cars need somewhat more caster because the race surface can vary greatly, and the suspension has to move through a greater range of travel. Too much caster, however, will make the steering heavy and unresponsive.

(Continued on page 160)



PART II

HOW TO INSTALL RADIO GEAR

by FRANK MASI

Mounting speed controllers

In Part I of "How to Install Radio Gear (*Car Action* May '92)," I explained the proper way to mount and set up a steering servo. Part II is a step-by-step guide to installing electronic and mechanical speed controllers.

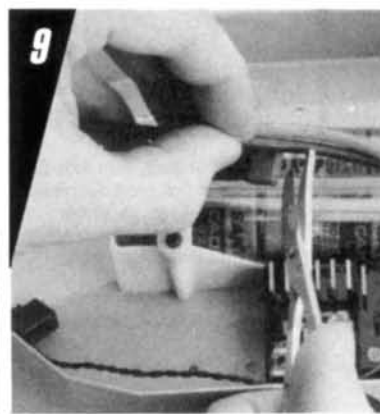
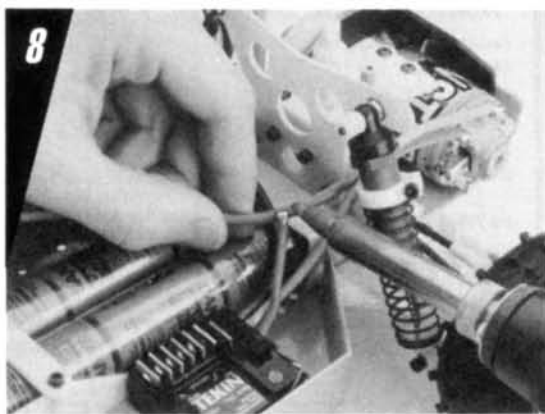
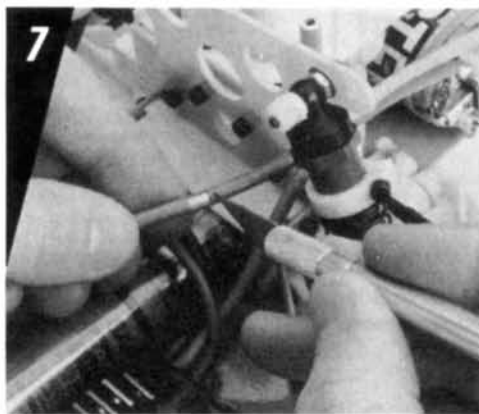
ELECTRONIC SPEED CONTROLLERS

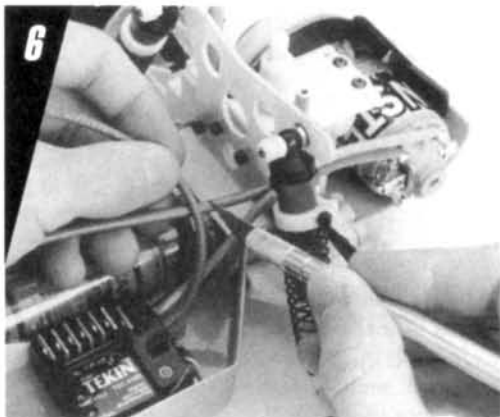
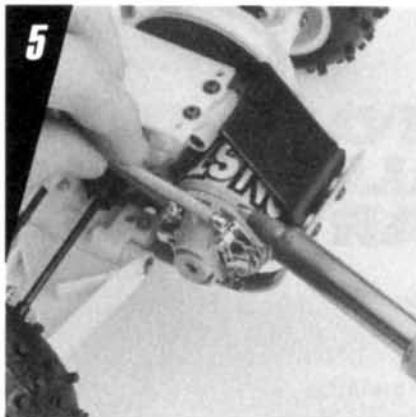
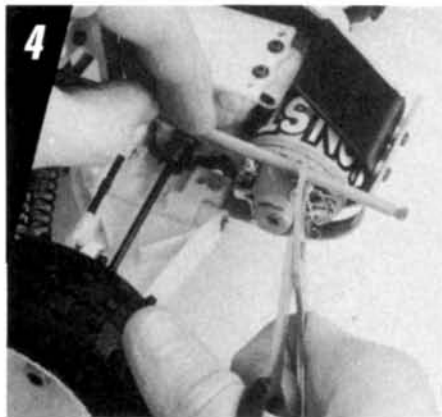
An electronic speed controller (ESC) is a high-precision switching device that's installed between the car's battery and its motor. It regulates power to the motor by switching on and off at a rate that's determined by the control impulses from the car's receiver, which, in turn, gets its commands from your transmitter. Today's ESCs are more reliable and perform better than those of the past, but you can still damage them if they're installed incorrectly.

Before you install your ESC, you must determine the best position for it on your chassis.

From the position that you choose, all ESC wires should be able to reach the motor and the battery pack. You should also mount the ESC so that its heat sinks will receive maximum airflow for cooling. When you've decided on the proper location, use motor spray (or another solvent that won't harm plastic) to clean the underside of the ESC and the part of the chassis to which it will be attached. (Avoid direct contact with any solvent, e.g., motor spray, as they can enter your bloodstream through your skin.) Apply servo tape to the ESC's entire underside (1) and attach it to the chassis (2).

On a three-wire ESC such as the one shown in these photos, you'll run one positive "jumper" wire directly from the motor's positive to the battery's positive. To do this, first solder the red wire to the positive motor terminal (3). Next, solder the blue motor





wire from the ESC to the motor's negative terminal. To determine the proper length, extend the wire to the negative terminal and cut off most of the excess (4), but be sure to leave a little extra wire to allow for gearing changes and different motors. Strip about $\frac{1}{8}$ inch of insulation off the blue wire, tin it with solder and attach it to the terminal (5).

Next, splice the ESC's positive wire (usually red) into the positive jumper wire that you've just soldered to the positive motor terminal. To minimize resistance, try to keep the wires as short as possible. Determine where the wires should be spliced, and cut the ESC's positive lead accordingly (6). With an X-Acto knife (or a similar tool), cut a small, rectangular piece of insulation out of the positive jumper wire (7). For the best solder connection, coat the exposed wire area with flux, and tin it with solder.

(Be sure to use flux that's made for electrical connections. It's available at hardware stores.) Strip about $\frac{1}{8}$ inch of insulation off the ESC's positive lead, and tin the exposed wire with solder. Using a hot soldering iron (the hotter the better), join the ESC lead and the jumper wire, making sure that the solder flows freely between the two wires for a strong connection (8). Keep this connection away from bare metal surfaces, e.g., chassis components and hardware. For extra security, you can insulate it with electrical tape. You may need an assistant to help you with a tricky soldering job like this one.

I use high-quality, low-resistance connectors to hook the ESC to the battery pack. Race Prep, Litespeed, Astro Flight, Trinity and Deans connectors work well. Con-

tors usually come in pairs—one "male" and one "female." The female connector has no exposed contacts, so use it on the battery pack to prevent shorting; attach the male connector to the ESC leads. Before you start, be sure to note the polarity of the connector terminals; many connectors have terminals that are marked positive and negative. After you've soldered the female

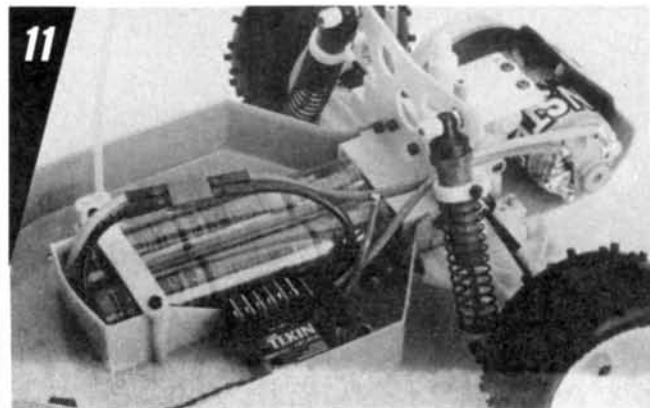
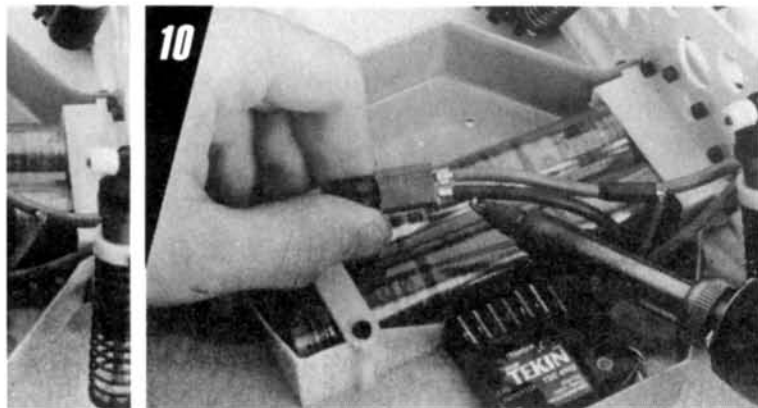
tery lead is usually black.) Strip $\frac{1}{8}$ inch of insulation off both wires, and tin the exposed parts with solder. Before you attach the wires to the male connector, slide a piece of heat-shrink tubing over each wire. Slide the heat-shrink as far down each wire as you can to avoid shrinking it when you solder the wires. Tin the connector terminals with solder, and at-

attach the positive jumper and the negative ESC lead to them (10), noting the proper polarity.

Slide the heat-shrink back up each wire until it's snug against the connector, and shrink it (11) using a hair dryer, a heat gun, or a soldering iron (held close to it, but not actually touching). You should now have a neatly installed ESC that will be the envy of all your racing pals.

Your neatly installed ESC will be the envy of all your racing pals.

connector to the battery-pack leads, extend the positive jumper wire and the ESC's negative battery lead to the connector and cut them even (9). (The ESC's negative bat-



PHOTOS BY YAMIL SUEZ

HOW TO INSTALL RADIO GEAR

MECHANICAL SPEED CONTROLLERS

Many R/C kits that are aimed at beginners include a mechanical speed controller, which consists of a servo-actuated "wiper" arm that moves across a series of contacts. When the wiper touches a contact, a circuit is completed and this allows voltage from the battery to power the car's motor. Mechanical speed controllers may have many such contacts to allow different speeds, e.g., three forward and two or three reverse contacts.

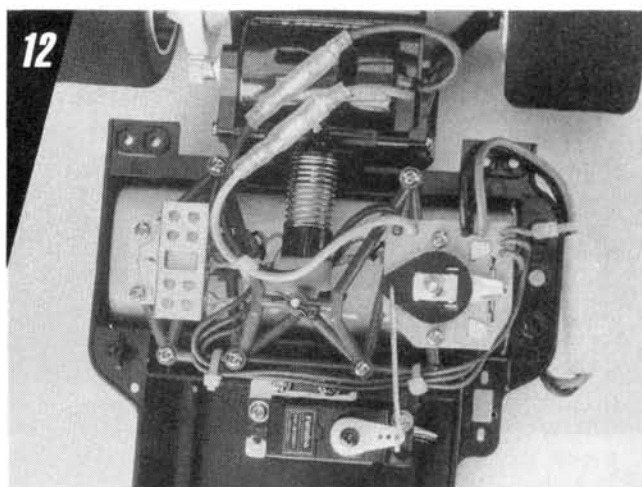
There isn't much guesswork involved with mechanical speed controllers. In most cases, the kit's manufacturer has done all of the figuring for you. The mounting location, the servo location and even the servo-to-speed controller linkage are provided. All you have to do is properly adjust

your transmitter to the action of the speed controller.

With the transmitter's throttle-trim adjustment in neutral, disconnect the car's motor and turn on its radio system. Connect the speed-controller linkage to the controller and the servo arm. Attach the arm to the servo so that it and the speed controller are in neutral (12). Now, plug the motor back

***This will help you
to avoid costly
lessons that can
result in burned-out
equipment and
empty wallets!***

into the speed controller (it shouldn't operate if the controller is in the neutral position), raise the rear tires (or, better yet, remove the pinion



gear) and move the transmitter's throttle trigger (or stick) all the way forward. The wiper arm should move to the full-speed position, but

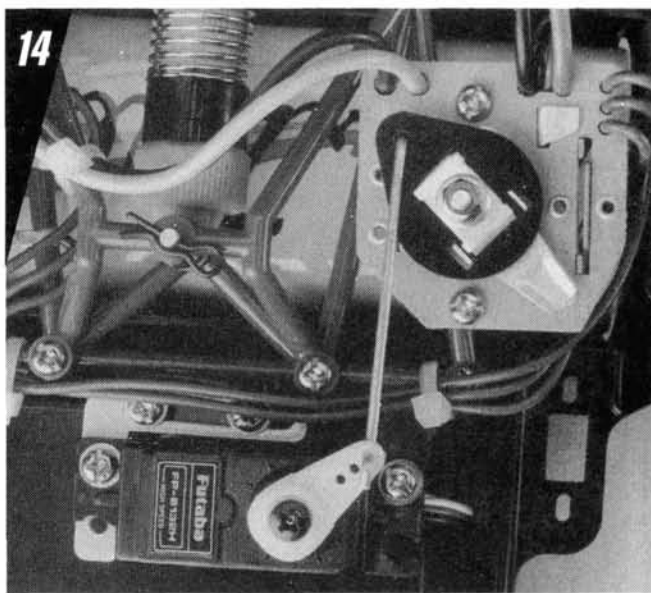
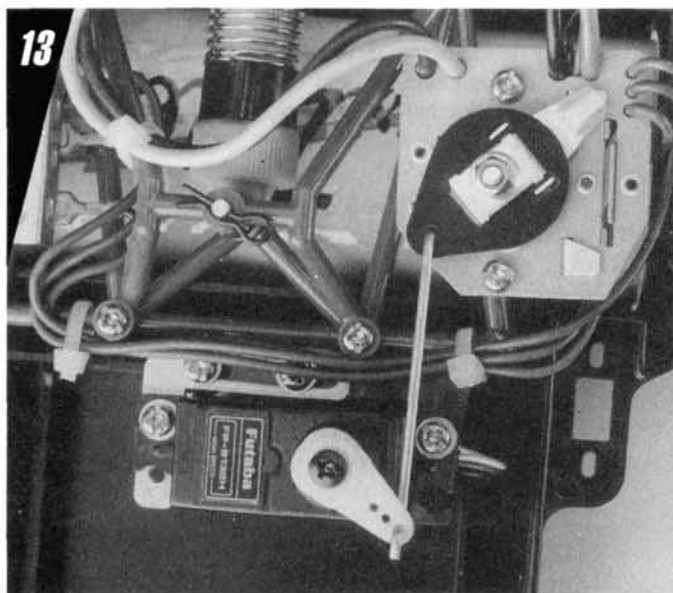
no farther (13). If it doesn't, adjust the throttle trim on your transmitter. Release the throttle. The speed controller should return to neutral, and the motor should stop operating. If your speed controller has reverse, its wiper arm should move to the

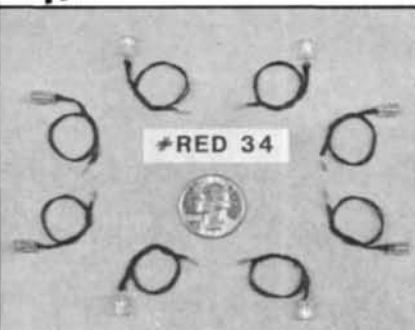
reverse-speed contact, but not past it, when you move the transmitter's throttle to the reverse or braking positions (14). Adjust the

transmitter's throttle trim until the desired range of movement is attained.

When I first started in R/C, there wasn't much information available, so I often learned the hard, expensive way—by experimentation. This article, and others like it in *Car Action*, will help you to avoid those costly lessons that often result in burned-out equipment and empty wallets!

The final article in the "How To Install Radio Gear" series will deal with receiver mounting and wire routing. Also, we'll give you the lowdown on motor capacitors—what they do and why you need them. Until then, keep 'em rolling. ■



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(Continued from page 103)

standard paint scheme—all black—because the car really looks best in dark colors. I had been worried about masking the head/taillights and painting the details on them later, but the kit includes decals of all such details. I only had to mask the windows (and the exterior to protect it from overspray) and spray the paint.

When the paint had dried, I applied the decals and mounted the rear spoiler and the side mirrors. (Note: you have to paint these accessories to match the body.) The result of all this work is one of the meanest-looking car bodies around!

DRIVING IMPRESSIONS

At last—the long-awaited test drive! First, I tested it with the stock 540 setup. I slowly accelerated the car and centered the steering trim. From a complete stop, I gunned it to full throttle. The car accelerated instantly (thanks to the 420F, it did this at any speed) and reached its top speed in no time. It was relatively fast and had fairly good throttle response.

Although the 540 was powerful enough to spin the car's wheels from a "zero" start, it was too mild for power slides and four-wheel drifts in the turns. I replaced it with the Gargantua, and I adjusted the controller and the radio to achieve maximum braking power. I slapped in a fresh battery pack and was ready to rock 'n' roll!

When I squeezed the trigger all the way, the Skyline lurched forward and...holy smoke! It had power! It ran twice as fast as before, and it accelerated like a 1/12-scale car. I slammed on full brakes as the car approached a turn, and I let it slide sideways on all four wheels. As it came rapidly out of the turn, I punched full throttle again. What a responsive car!

The body really makes this car exciting, and I couldn't stop roaring down the straights and power-drifting into the turns.

(Continued on page 145)

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THERE ARE many "do-everything" chargers available today; some even enable you to match, cycle and condition cells just as professional battery matchers do. Many people, however, prefer to let the pros match and cycle their cells; they only want to charge batteries using standard, simple, peak-detection chargers.

Ni-Cd nutrition

Novak's* durable, effective Peak-Plus, which was offered with or without a built-in voltmeter, was one such unit. As other companies developed chargers with linear charging capabilities and complex cell-rejuvenating circuitry, however, the Peak-Plus began to show its age. The people at Novak decided it was time to redesign it. The results? The all-new Digi-Peak and Digi-Peak Plus chargers.

HEART OF THE MATTER

The only difference between the two chargers is that the Plus comes with a built-in, digital voltmeter. (Note: the Digi-Peak comes with external jacks into which you can plug a voltmeter.) Both use Novak's 10-bit digital peak-detection circuitry, which monitors each cell's voltage to determine its charge status, i.e., how long before it's fully charged. They also employ 100-second lock-out circuits that prevent a charger from being "tricked" into reading that a cell is fully charged when it isn't. Although this "false-peaking" problem is usually rectified after sufficient voltage has been added to the cell, it can be frustrating—especially at the track where time is precious. The lock-out circuit prevents false peaking by charging a pack for 100 seconds, regardless of its voltage.

The chargers have two modes—linear and pulse. The linear mode, which can charge at 0 to 5 amps, has a unique feature: it enables you to adjust the

trickle-charge rate independently of the peak-charge mode. Now, you can charge your packs at relatively high rates and adjust the trickle rates from 0 to .3 amp. The trickle-charge will automatically begin when the peak-detection circuitry

shuts off the main charge.

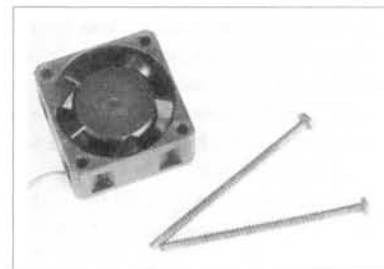
The linear mode is generally used to charge SCE cells, but you can also use it to charge other Ni-Cds, e.g., 50mAh receiver packs and 600mAh transmitter packs. In the pulse mode (used to charge

NUMBER-ONE FAN

How often have you burned your fingers on a charger's heat sink? Those aluminum heat magnets get pretty hot—especially while charging 4-cell packs.

To prevent this, many racers mount 12V fans on or near their chargers—the closer to the heat sink, the better. Well, Novak has good news for hot chargers: its Digi-Peak units can accept small, 12V, Novak fans. (They're included with models nos. 4410 and 4460, and they're available separately.)

Just screw the fan to the backplate



directly over the heat sinks, and plug it into a small receptacle that's also on the back-plate. It will operate when the charger is connected to a power source or a charged battery.



Novak's Digi-Peak chargers combine many useful features in small packages. The Digi-Peak Plus (shown) has a built-in LCD voltmeter

PHOTOS BY FRANK MASI

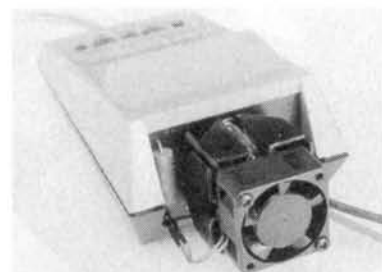
DIGI-PEAK CHARGERS

by FRANK MASI

SCR cells *only*), the trickle-charge is pre-set at .18 amp.

USING THE CHARGERS

Both units are very easy to operate. Simply connect either one to a regulated power source of up to 15 volts (which can produce at least 10 amps) using the included 5-foot-long detachable "zip" cord. (Note: full-size car batteries will work as power sources, but full-size car battery chargers aren't recommended because they aren't regulated.) It's best to use a source that can generate 7 volts more than the number of cells (not the voltage of the pack) you plan to charge, e.g., for a 6-cell pack,



Keeping cool! Some Novak chargers come with a fan that's mounted over the heat sink. A 12V plug is located on the backplate.

the source should be able to generate about 13 volts.

After you've connected a Digi-Peak charger to a power source, wait at least 100 seconds before you connect it to the battery. (This gives its circuitry time to "initialize" itself.) Hook it up to the battery using the included output lead, which comes with a Tamiya-style connector already attached. If you use other types of connector or you hard-wire your batteries, Novak includes a set of alligator clips that you plug into the output connector.

CASH OR CHARGE?

After you've hooked everything up, the chargers will trickle-charge the battery in either mode until you press the start button. (In the linear mode, you can prevent this by setting the

trickle rate to zero.)

In the linear mode, charge SCE cells at from 3 to 4.5 amps. (I usually charge SCEs at 3.5 amps; maybe at 4 or 4.5 if my qualifying heat is coming up.) Charge receiver packs at .4 amp and transmitter packs at 2 amps.

The Digi-Peak is ideal for those who only want to charge their batteries. Its switches and dials are convenient, and they work flawlessly.

(Note: these cells shouldn't be trickle-charged, so be sure to set the trickle rate to zero before you start.) In the pulse mode, you can charge SCR cells at 5 to 6.5 amps. They're more durable than SCE cells, and they seem to perform better when they're charged at a higher rate.

The voltmeter on the Digi-Peak Plus displays the voltage of the pack and its charge rate (in amps) as well as the voltage of the power source. This handy meter lets you monitor the pack's voltage to determine its charge status.

PLUS OR MINUS?

The Digi-Peak is ideal for those who only want to charge their batteries. Its switches and dials are convenient, and they work flawlessly. (You only have to tap the start button and the unit will start to charge.) The independent trickle-charge adjustment is nice because it lets you tailor the charging mode to suit your needs. I recommend that you buy the Digi-Peak Plus, though. It doesn't cost much more than the standard unit, and its voltmeter is very useful.

Not everyone needs (or can afford) chargers that match and cycle cells. It's nice to know that some manufacturers realize this!

**Here's the address of the company featured in this article:
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Joel's Cleveland Winner

by JOHN HUBER

AT THE '91 Cleveland Indoor Winter Champs, Joel "Magic Man" Johnson bested some of the world's finest racers—first by top-qualifying and then by winning the A-Main by more than a lap! The Cleveland race has become the premier $1/12$ -scale racing event in the U.S., and it's often used as a proving ground for the newest $1/12$ -scale technology. The Magic Man was kind enough to send us his winning car so that we can share some of its high-tech innovations with you.

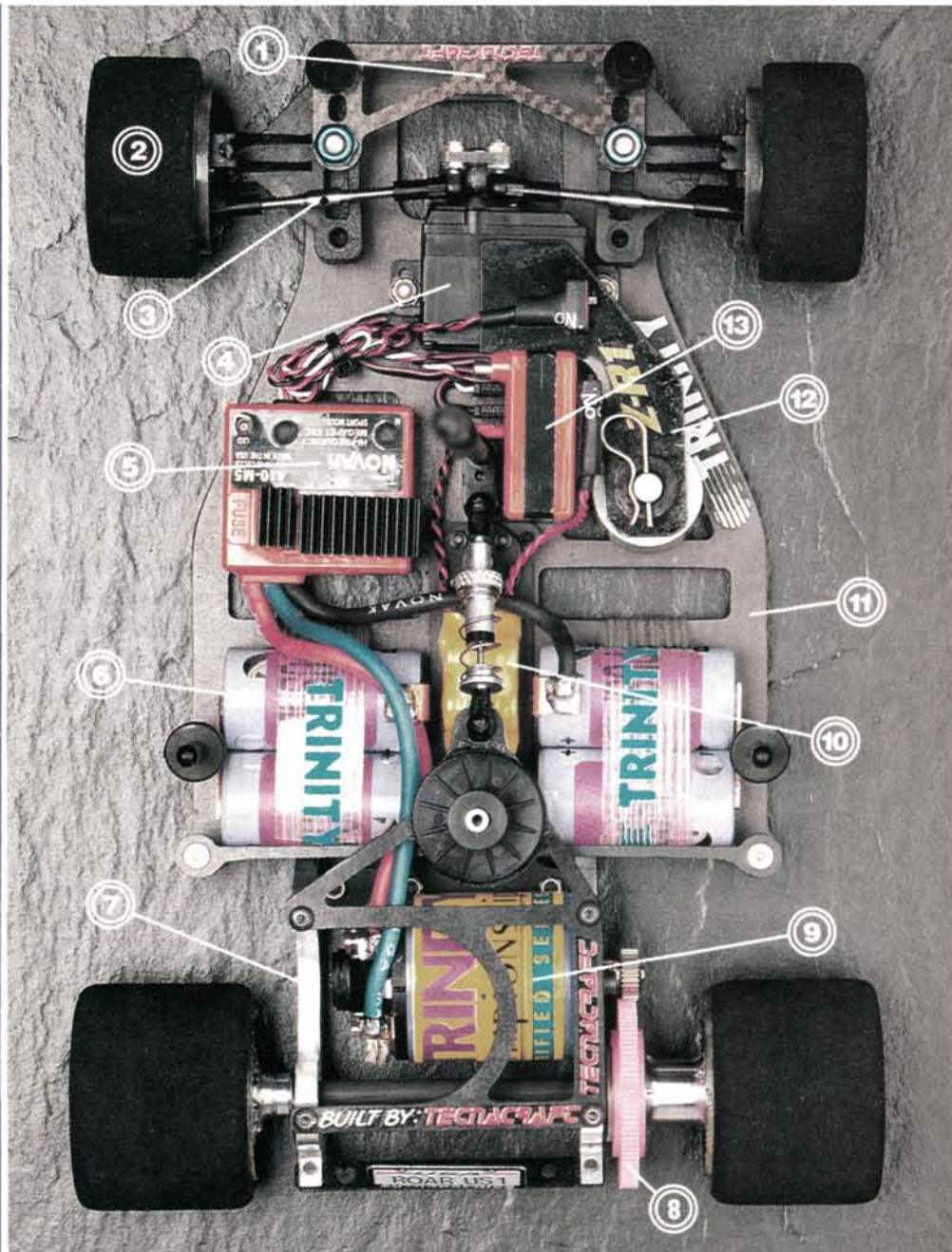
THE CHASSIS

At the '90 Winter Champs, Joel used a Corrally car, but in '91 he used an Associated* RC12LW, and he replaced its stock chassis with one from Composite Craft.* To lighten the chassis, he removed material from it without affecting its overall strength. (See the photos.) He also used lightweight aluminium hardware throughout the car. To keep the front end aligned perfectly, he installed a rigid HPI* brace between the front arms.



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Trinity Buzz Saw motor
10.
Trinity 5-cell receiver pack
11.
Composite Craft graphite
chassis and parts
12.
Bud's* Practice
transponder weight
13.
Novak NER-3FM receiver



ELECTRONICS

Joel chose a Novak* 410-M5 ESC and NER-3FM receiver. (The 410-M5 isn't considered Novak's top-of-the-line ESC because it doesn't have a torque limiter, but this feature isn't necessary on carpet, so the M5 was the perfect choice.) A lightweight (1.08 ounces) Airtronics* 94143 servo guided his rocket to the finish line. Its .08-second transit time enabled the car to respond rapidly to Joel's commands.

At the '91 Champs, many racers experimented with new batteries, including the Sanyo 1700mAh SCRC cells, which didn't last the full 8

minutes. Most racers ended up using the Panasonic P-170 cells, which dump gradually and have greater capacities. To power his ride, Joel used Trinity* Pushed Team P-170s and a Trinity Championship series motor—the 14-turn, double-wind Buzz Saw.



Joel used a custom-made Tecnacraft 1/12-scale pod for his Cleveland Champs car. (It's similar to the 1/10-scale RC10L pod the company now offers. No word on availability.)

THE POD

This car's unique pod was custom-made by Tecnacraft*. (It's similar to the RC10L pod the company now offers, but it's in 1/12 scale. No word on availability yet.)

Instead of a traditional setup, i.e., upper and lower plates



Joel put a Bud's Practice transponder weight in the car so that the weight would be distributed evenly throughout the chassis. Notice the beautiful ZR-1 wheels.

Joel rode to victory on TRC's new ZR-1 foam tires. Their dish-shape rims, which have a circular pattern of holes in them, are similar to those used on Kent Clausen's Insane Run car at the Thunderdrome.

with aluminum or nylon sides, the pod consists of two aluminum plates, one of which is used as the motor mount. As on standard cars, a graphite plate joins the halves on top. The bottom of the pod isn't flat; instead, it curves upward from front to rear. A thin graphite strip on the bottom of the chassis joins the pod sides. This innovative setup reduces the car's weight by 1/2 ounce, yet it's extremely rigid.



A Novak 4.10-M5 ESC (the best ESC without a torque limiter) is the heart of the power system.

To accommodate large spur gears, Joel uses Kimbrough's* offset, rear-bearing brackets, which replace the stock, rear-pod, ride-height adapters. They also allow him to move the axle forward or backward.

WHEELS OF FIRE

Joel rode to victory on TRC's new ZR-1 foam tires. Their dish-shape rims, which have a circular pattern of holes in them, are similar to those used on Kent Clausen's Insane Run car at the Thunderdrome. The shape of these rims and the composite material of which they're molded makes them extremely stiff.

We thank Joel and Trinity for sending us the winning car. With his Winter Champs victory, Joel has worked his magic again.

*Here are the addresses of the companies mentioned in this article:

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

Composite Craft, 5885 Lake Hurst Dr., Orlando, FL 32819.

HPI, 22600-C Lambert St., Ste. 904, El Toro, CA 92630.

Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

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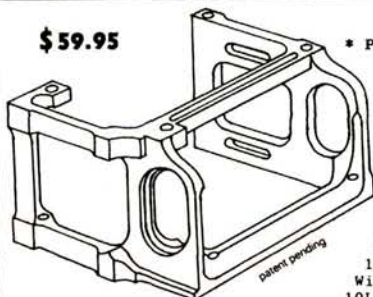
- * Sammy Blackwell won (1st place) Stock 2WD; A-Main 1989 R.O.A.R. 1/10 Dirt Oval Nationals
- * Jack Kloeber TQ'd and won (1st place) Stock; A-Main 1990 R.O.A.R. 1/10 Scale Nationals in Dallas, Tx.
- * Jimmy Piercell TQ'd and won (5th place) Stock; A-Main 1990 Cleveland U.S. Indoor Championships
- * Sean Cochran qualified 7th and won (1st place) Stock; A-Main 1990 Cleveland U.S. Indoor Championships

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SWIM



Most of the great shoot-outs in history took place in the Wild West. The trigger fingers of Jesse James, Wild Bill Hickok, Wyatt Erp, etc., were feared by all who crossed their paths. Their weapons?—six-shooter pistols.



Today's top guns have names like Doseck, Johnson, Clausen, Rott, Burch and Dobson, and their trigger fingers are just as lethal. Their weapons?—pistol-grip radios. (Actually, it's Dobson's *thumbs* that are feared, because he uses a twin-stick radio.)

In October '91, with 150 other racers, these six converged on PC Hobbies in King, NC, to compete in the *R/C Car Action Superspeedway Shootout II*. This part of North Carolina is at the heart of *full-scale* stock-car country, so the Shootout was popular with locals.

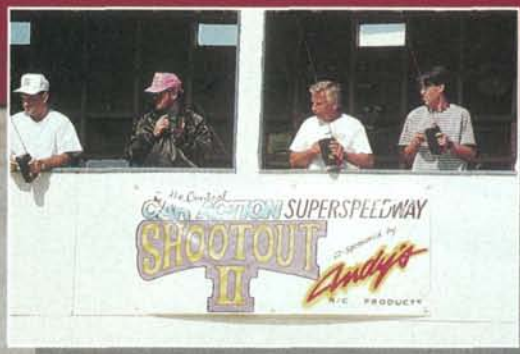
Three of the four 1991 ROAR Paved Champions showed up—Todd Putnam, Chris Doseck and Terry Rott.

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SHOOT**

Top triggers take aim



The showcase event was the *R/C Car Action/Andy's Products 500*—a 500-lap, superspeedway-style race with pit stops.

SUPER SHOOTOUT SITE

Paul Covington's PC Hobbies is one of the finest racing facilities I've ever seen—a large, high-banked tri-oval, a gigantic drivers' stand, a well-stocked hobby shop, an indoor carpet

oval and plenty of indoor and outdoor pit space. The track is ringed by wooden retaining walls, and the grass infield is well-kept.

QUALIFYING

On Friday, each racer ran two "hot laps." These single-car qualifying laps were used to set up the 10-car qualifying heats that were run on Saturday and Sunday. This system allowed

drivers to go all out in an attempt to run two perfect laps, and it might be the fairest way to set up heats, because it doesn't give well-known drivers an advantage by grouping them in seeded heats.

Heats for the timed classes were set for three rounds of qualifying on Saturday and one round on Sunday morning before the Mains. Also on Friday there were two rounds of 12-

ANDY'S R/C PRODUCTS SPONSOR

SPEEDWAY SHOOTOUT II

by WALLY DAVID



Below left: with its longer qualifiers and Mains, superspeedway racing always thrills the crowds. Pit stops are critical; the faster they are, the better your chances of winning. Here, one pitman holds the car while the other changes its battery.

Below middle: versatile Joel "Magic" Johnson—winner of the Cleveland 1/12-scale Winter Champs—takes in some exciting superspeedway action. Johnson qualified 2nd in the 1/10-scale Modified Class, but a technical error prevented him from competing in the main event (see text).



minute qualifiers for the Superspeedway racers.

● **1/10-Scale Stock.** Qualifying was very tight: all 10 drivers turned 33 laps, and only 5 seconds separated top qualifier Cary Poole and 10th qualifier Brian Painter. Poole's time was 4:01.93, and he

was followed by Tim Holland (4:02.15) and Steve Scaggs (4:02.67), who was the most consistent driver—the only one who turned 33 laps in all four of his heats.

● **1/10-Scale Modified.** Because the track is so smooth and wide, it really let these cars tear up the track during their 4-minute

racers. The top three qualifiers turned a blistering 37 laps, and a fourth just missed the mark.

Andy Dobson was the fastest: 4:03.40. He just edged out Trinity teammate Joel Johnson (4:03.97). Johnson's car had been heavily modified, (the chassis was by

1/10-SCALE MODIFIED

Fin	Qual	Name	Chassis	Motor	ESC	Radio	Batteries	Body	Tires
1	4	Chris Doseck	Assoc. RC10L SS	CAM 11T	Novak 410 MXc	KO Propo	CAM Ace Pilot	Bolink Grand Prix	TRC/TM Radials
2	3	Craig Perry	Bolink LTO SS	East Coast 12T	Tekin 411P	Futaba	PTI	Bolink Thunderbird	TRC/TM Pro Radia
3	6	Terry Rott	Bolink LTO SS	East Coast 11T	Novak 410 MXc	Airtronics	East Coast	Bolink Thunderbird	TRC/TM Pro Radia
4	1	Andy Dobson	TRC Lynx II SS	Trinity 11T	Novak 410 MXc	Futaba	Trinity	Bolink Thunderbird	TRC/TM Pro Radia
5	5	Blair Sonzogno	TRC Lynx II GE*	Trinity 11T	Novak 410 MXc	KO Propo	Trinity	Andy's Grand Prix	TRC/TM Pro Radia
6	8	Kent Clausen	Assoc. RC10L SS	Reedy 11T	Novak 410 MXc	Futaba	Reedy	Assoc. Grand Prix	TRC/TM Pro Radia
7	10	Brad Boye	TRC Lynx II SS	CAM 11Q	Novak 410 MXc	Futaba	Team Smooth	Bolink Grand Prix	TRC/TM Pro Radia
8	7	Chris Smith	TRC Lynx II GE*	East Coast 11T	Novak 410 M1c	Airtronics	East Coast/King	Bolink Thunderbird	TRC/TM Pro Radia
9	9	Budde Wolfe	Bolink LTO SS	Wolfe 11Q	Tekin 411P	Futaba	A&D	Bolink Grand Prix	TRC/TM Pro Radia
10	2	Joel Johnson	Assoc. RC10L SS†	Trinity 11T	Novak 410 MXc	Airtronics	Trinity	Andy's Grand Prix	TRC/TM Pro Radia

* GE = Ground Effects

† Johnson's RC10L SS had been heavily modified with Composite Craft parts

1/10-SCALE GAS

Fin Qual	Name	Chassis	Radio	Body	Tires	Sponsors
1 ... 3	Daniel Mullins	Advantage Avenger	Futaba	Bolink Lumina	TRC/TM Pro Radials	Advantage Products
2 ... 1	Kent Clausen	TRC Python	Futaba	Assoc. Grand Prix	TRC/TM Radials	Associated, Reedy, Lavco, Novak, Futaba, Du-Mor R/C, Bud's, TRC
3 ... 5	Joe Vaughn	Advantage Avenger	Futaba	Bolink Lumina	TRC/TM Radials	
4 ... 2	Ralph Burch	TRC Python	Futaba	Bolink Grand Prix	TRC/TM Radials	Hyperdrive, CAM, Futaba
5 ... 8	Robert Joyce	TRC Python	Futaba	Bolink Grand Prix	TRC/TM Radials	Custom Racing, King R/C
6 ... 6	Joel Mullins	Advantage Avenger	Futaba	Bolink Lumina	TRC/TM Pro Radials	Advantage Products
7 ... 9	Jim Fuller	TRC Python	Futaba	Andy's Thunderbird	TRC/TM Pro Radials	TRC/Composite Craft
8 ... 7	Nancy Mullins	Advantage Avenger	Futaba	Bolink Lumina	TRC/TM Pro Radials	Advantage Products
9 ... 4	Robin Nelson	Advantage Avenger	Futaba	Bolink LeBaron	TRC/TM Radials	Advantage Products

Composite Craft). Third fastest was Craig Perry (4:05.69); and Chris Doseck managed 36 laps in 4:00.65.

● **1/10-Scale Gas**—8-minute races and the weekend's wildest class! Even though the track is smooth, without the supple suspension of electric cars, these hard-to-hold cars looked more like unlimited hydroplanes than racing cars. Add smoke, smell and sound, and they seemed exceptionally fast.

Associated's Kent Clausen TQ'd with 42 laps in 5:03.64—an average of 38.8mph; this would have TQ'd in the Stock Class but would have qualified him only for 37th in Modified. Driving PC Hobbies house car, Hyperdrive's Ralph Burch was second fastest with a 41/5:06.86. By turning 40 laps in 5:03.81, Daniel Mullins qualified in 3rd.

● **Superspeedway Racing.** These longer races were the most popular with spectators because of the lightning-fast pit stops and time they gave drivers to make up for early bad luck.

Doseck completed 106 laps in 12:01.21 to take TQ honors. Perry qualified 2nd (105/12:00.25); and 3rd was Dobson, driving a Trinity-powered Lynx II SS with a prototype quick-change battery-mounting system (105/12:05.77).



Two-time R/C Thunderdrome Insane Speed record holder Kent Clausen readies his car for competition. He had a successful weekend—6th in the 1/10-scale Modified Class and 2nd in the new 1/10-scale Gas Division.

Burch was conspicuous by his absence. In both qualifiers, he had trouble getting around the same driver. It's really disturbing that sometimes, no matter how good a driver you are, someone can ruin your chances.

READY... AIM... FIRE

Held late on Saturday afternoon, the *RC Car Action*/Andy's Products 500 was the first main event. PC Hobbies has a wide pit lane with 10 spaces marked. Each team had a pit table with their battery chargers set up to

keep their packs peaked—approximately 20 battery packs each. Spare parts and tools were spread out for emergencies.

We expected the race to take about an hour, so there was plenty of action to look forward to. Track owner Paul Covington drove the pace car as the field took two warm-up laps side by side. It was all they could do to keep behind the pace car, but as it pulled off the track, TQ Doseck got his CAM-powered RC10L SS out front to take the early lead over Dobson and Perry. Doseck and Dobson quickly pulled away from rest of the pack.

The first pit stops came at around the 4-minute mark. Doseck retained the lead, even though his pit crew, Todd Putnam and Bill Horne, had a little trouble getting the hang of things. Doseck didn't help them by coming in too fast and sideways.

Terry Rott came out in 2nd. He benefitted from incredible pit work by East Coast's Dave Timmerman, who used Bolink's system to handle the pit stops alone—truly incredible! He caught the car, popped out the old battery, slapped in the new one and got the car back on the pit lane in 3 seconds. Rott, too, was very smooth entering and leaving the pits.

Sponsors

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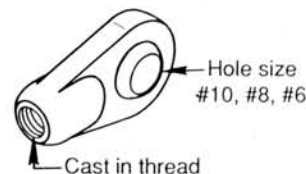
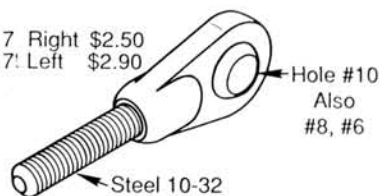
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With their 7-second pit stops, Rott and Timmerman were the best driver/pit-crew combo. Dobson left the pits in 9th position with a lot of ground to make up.

With each stop, Doseck and his crew got themselves together and decreased the time they spent in the pits. Early on, Rott took the lead for a while, but this was Doseck's show. Dobson made an impressive comeback from his early troubles in the pits to finish just three laps behind Doseck and take 2nd place. Local favorite Chris Smith had a solid run and moved into 3rd place with about 150 laps to go. Rott, the 1991 ROAR 1/10-Scale Modified Paved Oval Champion, had trouble late in the race and wound up in 4th place.

This type of racing is very exciting. I was amazed that it was such a tight race—such a small margin of victory. In a 4-minute race, it isn't unusual for a driver to win by a lap. This race lasted for nearly 60 minutes, so Doseck could conceivably have won the race by 14 or 15 laps.

SUNDAY ACTION

● **1/10-Scale Gas**—Sunday's first main event was an 8-minute race. The noise and

smoke of these nitro nightmares quickly caught the crowd's attention.

TQ Clausen's TRC Python was shoved from behind, and this caused a mess at the front of the pack. I couldn't believe this was happening on the *pace lap*! Cars flew over the outside retaining wall and slid into the infield. Joel Johnson, acting as Clausen's pit crew, frantically retrieved the car and tried unsuccessfully to start it before the rest got going. Second qualifier Burch took the green flag. He held the lead for a number of laps and then crashed with Clausen, who had joined the race late. That accident knocked Burch from contention and allowed Mullins to move into 1st.

Even after a late-race confrontation with a back marker that wiped out his front body mounts, Mullins

kept the lead to the end. Clausen moved up to make a late charge, but he finished three laps behind in 2nd. Joe Vaughn finished 3rd.

● **1/10-Scale Stock**. At the start, the leader was taken out at the front of the pack. This time, Poole and second qualifier Holland crashed, and both spun off the track. This shunt allowed fourth qualifier Jamie Harbell to move into first, followed by

third qualifier Scaggs. After a minute, Ernie Bucci was in the lead followed by Scaggs and the Lynx II SS of Blair Sonzogni. Meanwhile, Poole had moved up and was quietly lurking in 5th, waiting for something to happen.

By the halfway point, Sonzogni had pulled up on the Bucci's back door, and when heading down the main straight, Bucci's car slowed and Sonzogni had only one place to go—into Bucci's rear. This mishap allowed Poole to take the lead—an incredible twist of fate. Scaggs was now back in 2nd.

It looked as though Poole would win, but—like the Paved Oval Nationals where he looped his car on the last lap—while avoiding a wreck coming out of turn two, his car broke loose, and Scaggs took the lead. Scaggs held on to win, Sonzogni finished 2nd, and "the Heartbreak Kid" Poole finished 3rd.

● **1/10-Scale Modified A-Main**—the final race of a great weekend. We braced for an explosive start as Team Trinity had the front row, but as the starting horn went off, only Dobson's Lynx II SS exploded from the line. Johnson's RC10L SS was dead in the water, and other drivers had a hard time avoiding it. Inexplicably, his speed-controller leads hadn't been soldered to his batteries.

Doseck slipped into the lead, followed by Perry, Rott and Dobson. After a minute, Dobson moved into 2nd—right on Doseck's rear bumper. Lap after lap, Dob-



Competitors in the Car Action/Andy's 500-lap race were allowed to use only 20 battery packs. Racers charged and maintained their packs on trackside tables.

1/10-SCALE STOCK

Fin	Qual	Name	Chassis	Motor	ESC	Radio	Batteries	Body	Tires
1	3	Steven Scaggs	TRC Lynx II SS		Tekin 411P	Futaba	Elite	Bolink Grand Prix	TRC/TM Pro Radials
2	7	Blair Sonzogni	TRC Lynx II SS	H	Tekin 411P	KO Propo	Trinity	Andy's Grand Prix	TRC/TM Pro Radials
3	1	Cary Poole	TRC Lynx II SS	A	Novak 410 M1c	Futaba	PTI	Bolink Grand Prix	TRC/TM Pro Radials
4	10	Brian Painter	Bolink LTO SS	N	Novak T-4	Futaba	Mustang	Bolink Grand Prix	TRC/TM Pro Radials
5	4	Jamie Harbell	TRC Lynx II SS	D	Novak 410 M1c	Futaba	Hagerstown Moped	Bolink Grand Prix	TRC/TM Pro Radials
6	5	Ernie Bucci	TRC Lynx II SS	-	Novak M5	Futaba	Super Cell	Bolink Grand Prix	TRC/TM Pro Radials
7	9	Mike Hearld	TRC Lynx II SS	O	Novak 410 MXc	Futaba	Hagerstown Moped	Bolink Grand Prix	TRC/TM Pro Radials
8	8	Larry Flowe	TRC Lynx II SS	U	Tekin 411P	Futaba	PTI	Bolink Thunderbird	TRC/TM Pro Radials
9	2	Tim Holland	TRC Lynx II SS	T	Novak 410 M1c	Futaba	PC Hobbies	Bolink Grand Prix	TRC/TM Pro Radials
10	6	Richard Bostic	Assoc. RC10L SS		Tekin 411P	Futaba	Team Smooth	Assoc. Grand Prix	TRC/TM Pro Radials

R/C CAR ACTION/ANDY'S R/C PRODUCTS 500

Fin	Qual	Name	Chassis	Motor	ESC	Radio	Batteries	Body	Tires
1	1	Chris Doseck	Assoc. RC10L SS	CAM 11T	Novak 410 MXc	KO Propo	CAM Ace Pilot	Bolink Grand Prix	TRC/TM Radials
2	3	Andy Dobson	TRC Lynx II	Trinity 12T	Novak 410 MXc	Futaba	Trinity	Bolink Grand Prix	TRC/TM Pro Radials
3	5	Chris Smith	TRC Lynx II GE	East Coast 11T	Novak M5	Airtronics	King RC	Bolink Thunderbird	TRC/TM Pro Radials
4	6	Terry Rott	Bolink LTO SS	East Coast 11T	Novak 410 MXc	Airtronics	East Coast/PTI	Bolink Thunderbird	TRC/TM Pro Radials
5	8	Jim Fuller	TRC Lynx II SS	East Coast 11T	Novak 410 MXc	Futaba	PTI	Bolink Thunderbird	TRC/TM Pro Radials
6	10	Kent Clausen	Assoc. RC10L SS	Reedy 11T	Novak 410 MXc	Futaba	PTI	Assoc. Grand Prix	TRC/TM Pro Radials
7	7	Chris Rice	TRC Lynx II	East Coast 112S	Tekin 700	Futaba	East Coast	Bolink Grand Prix	TRC/TM Enduro Radials
8	9	Dave Reber	Hyperdrive H10SE	CAM 12Q	Tekin 700	Futaba	PTI	Bolink Thunderbird	TRC/TM Pro Radials
9	4	Craig Cary	Bolink LTO	CAM 11T	Novak 410 MXc	Airtronics	CAM	Bolink Thunderbird	TRC/TM Radials
10	2	Craig Perry	Bolink LTO SS	East Coast 12S	Tekin 411P	Futaba	PTI	Bolink Thunderbird	TRC/TM Radials

son tried to pass Doseck—the most incredible racing! Coming out of turn two, Dobson blew by and took the lead, but not for long. Entering turn three, Doseck dropped down onto the yellow paint in an attempt to get back into the lead.

Then the cars “wiggled” and touched (Dobson’s was thrown up into the retaining wall). This gave Perry and Rott a chance to challenge Doseck’s lead, and for the last few laps, Perry hounded Doseck in another incredible display of cat-and-mouse driving. On the last lap, exiting the fourth turn, Perry pulled alongside Doseck, but couldn’t pull it off.

Doseck won by a mere seven-hundredths of a second. Less than a length separated 1st and 2nd place! Rott finished 3rd, and Dobson recovered to take 4th.

TRACK TRENDS

- Of the top 10 qualifiers in Stock and Modified, nine had their best run in the morning or evening qualifying rounds. Only Larry Flowe, who qualified 8th in Stock, had his best run in the second round, when the track was at its warmest. Even in October, the heat seemed to have an effect.
- TM Radials seemed to be the tire of choice for this track. TM’s new Pro Radials (unofficially referred to as “wrap-

arounds”) were an unqualified success. All drivers in the four A-Mains used TM Radials. Everyone in the Stock A-Main



used the Pro Radials, and only Chris Doseck chose the old-style radials in the Modified A-Main. Six cars in the 500-lap race used the Pro Radials, three used the old-style radials, while one used Enduro Radials, which have thicker rubber. The only reported tire failure was on the car of Kent Clausen. In the 500-lap race, his car’s front end was damaged, and that caused the rubber on the right front tire to be worn away, but he completed the race. TRC’s Tim Morton told me that, to his knowledge, all the drivers used TM Radials.

- The Pontiac Grand Prix was the dominant body (22 A-Main cars had them). Ford’s Thunderbird was the second choice (12), and that was followed by four Chevy Lumina and a lone Chrysler LeBaron. Bolink bodies were the most numerous at this race (31 of the 39 bodies in the A-Mains). Andy’s and Associated shared second-place honors (four each).
- TRC/Composite Craft’s Lynx II was the most popular car (16 out of 30 in the A-Mains). There were seven Bolink LTOs, six Associated RC10Ls and one Hyperdrive.

Twenty-one of 30 electric cars used Team Novak electronic speed controllers; the rest were by Tekin.

WRAPPING IT UP

The *R/C Car Action* Superspeedway Shootout II had all the elements of the great shootouts of the Wild West. Triggers. Nerves of steel. Ice water running through their veins. I can’t wait for next year’s race.

Thanks to Andy Jacobson of Andy’s Products for co-sponsoring the race with *R/C Car Action*, and to Paul Covington and the friendly staff of PC Hobbies, who know how to put on a great race. ■

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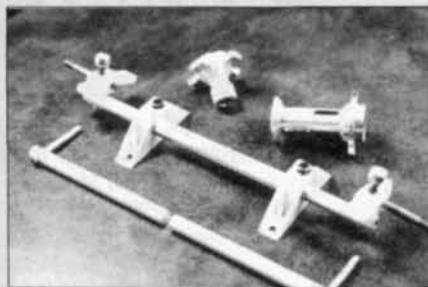
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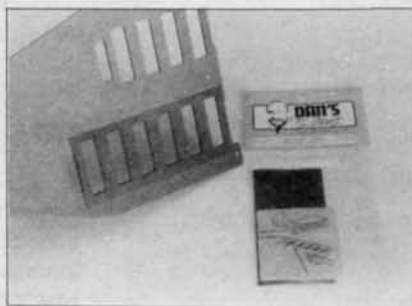
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Part no. 10038 (3x3 saddle pack); 10039 (6-cell, in-line pack)

Price: \$3.50

For more information, contact Dan's RC Stuff, 9525 Cozycroft Ave., Chatsworth, CA 91311.



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Body Brace

HPI's new Body Brace for NASCAR oval-racing bodies will reinforce the rigidity of rear body posts. It's available for the RC10L and the RC10L SS.

Part no. 6135 (RC10L); 6140 (RC10L SS).

For more information, contact HPI, 22600-C Lambert St., Suite 904, El Toro, CA 92630.

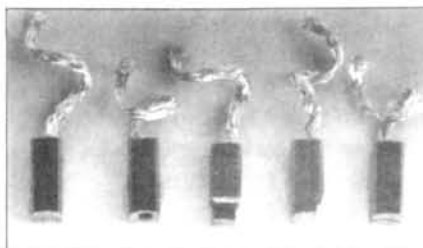
BUD'S RACING PRODUCTS HPS Motor Brushes

These 15-percent silver brushes are the key to unlocking your stock or modified motor's performance potential. They're available in several designs.

Part no. 7155 (standard); 7156 (hollow); 7157 (3 sides cut); 7158 (timed); 7159 (air-cool slot); 7155-B (standard 25-pair bulk pack); 7156-B (hollow 25-pair bulk pack); 7157-B (3 sides cut 25-pair bulk pack).

Price: \$3.50/pair; \$4/pair; \$4/pair; \$4/pair; \$4/pair; \$68.75; \$81.25; \$81.25.

For more information, contact Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.



BOLINK

LTO Quick-Change Car Kit

Bolink's latest LTO has a special chassis with a quick-change system that allows for rapid pit stops. It has soldered tabs instead of plates or plugs; you just remove the 6-cell, stick-type battery pack from underneath the car. The kit comes as a complete rolling chassis with three sets of battery connectors. (Radio gear isn't included.) Bolink also offers Quick-Change conversion kits to fit the LTO and the LTO SS. Each includes a special chassis and all the necessary hardware.

Part no. BL-1379 (complete chassis); BL-5079 (LTO conversion kit); BL-5079-N (LTO SS conversion kit).

Price: \$284.95; \$89.95.

For more information, contact Bolink Products, 420 Hosea Rd., Lawrenceville, GA 30245.



BOLINK

Adjustable Ride-Height Kit

Bolink now offers ride-height adjusters for the Eliminator 12 and the LTO 12. The kit includes three nylon inserts and two replacement motor mounts that are built to accept the axle holders used in their 1/10-scale cars.

Part no. BL-5374-B

Price: \$29.95

For more information, contact Bolink R/C Cars, Inc. 420 Hosea Rd., Lawrenceville, GA 30245.

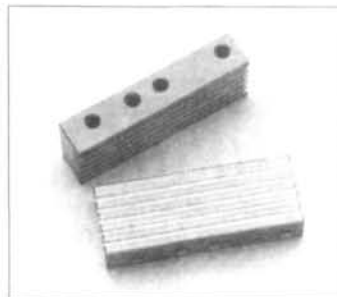
KYOSHO Heat-Sink Engine Mount

Kyosho's heat-sink engine mount is perfect for any 1/8-scale off-road buggy chassis. Its fin-cut design increases its cooling capacity, reducing engine temperature and improving overall performance. All mounts come in dazzling purple-anodized aluminum.

Part no. KYOC3459

Price: \$29.50

For more information, contact Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826.



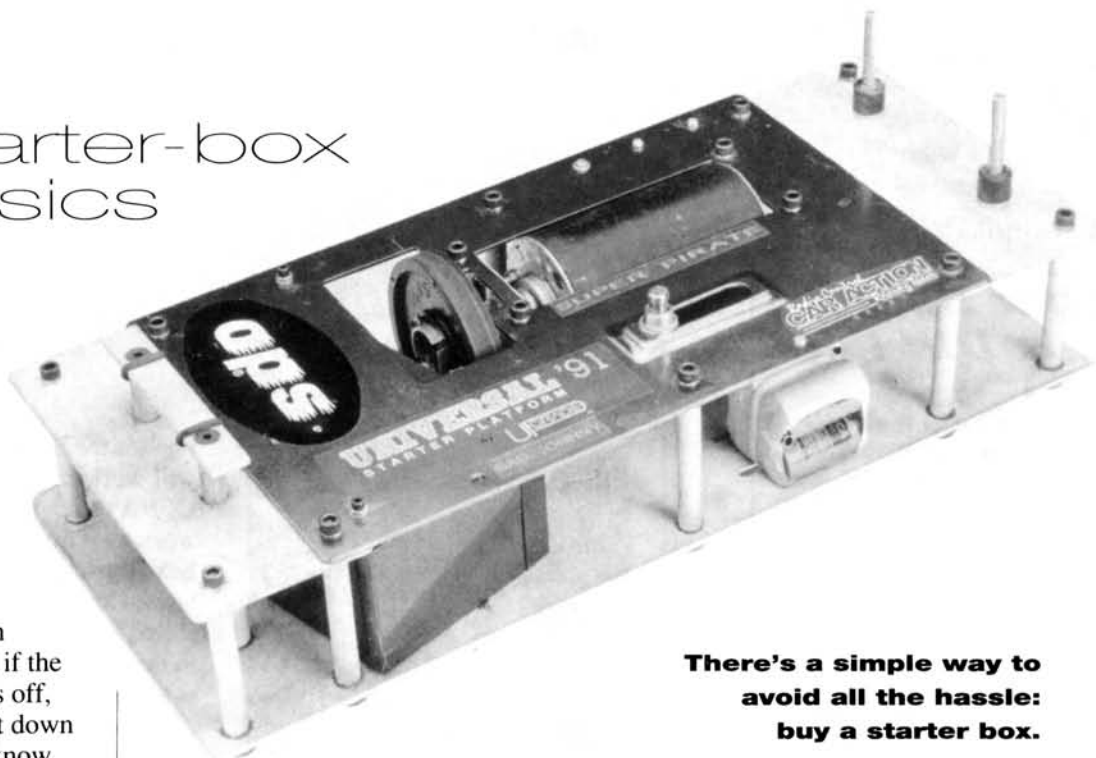
Starter-box basics

SOMETIMES, starting a 1/8-scale buggy or truck is a real hassle. Using a hand-held starter isn't easy; your arm gets very tired, and if the starter wheel comes off, you have to chase it down the street. (I don't know exactly how many rpm a starter has, but the wheel sure moves quickly!) There's a simple way to avoid all the hassle: buy a starter box.

BOX O' GOODIES

A starter box is basically a starter that's attached to the inside of a box. You attach alignment posts to the top of the box so that you can position the car's flywheel directly over the starter wheel. To turn over the engine, just press down on the car and a switch activates the starter. Most starters have a spring that lifts the car off the wheel when the engine starts.

There are several ways to power the starter. The easiest method is to attach alligator clips to its motor leads, and then hook the clips directly to the battery in a full-size car. You can also connect the starter to a field-box battery or, if there's enough room, you can mount a battery to the inside of the starter box for a hassle-free system.



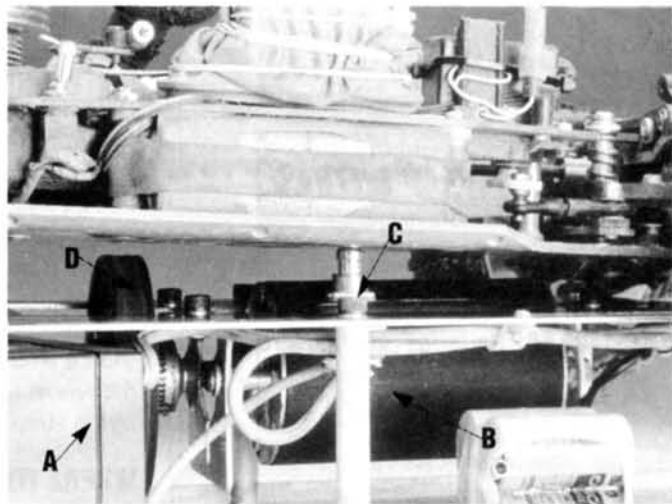
There's a simple way to avoid all the hassle: buy a starter box.

Start Me Up!

by JOHN HUBER

GLOW POWER

Why not put the Ni-Cd starter for your glow plugs in the starter box, too? That way, you'll never leave it at home. You can make a starter using some of those Ni-Cd batteries you have lying around collecting dust. I wired four 1400mAh cells in parallel for a total of 5600mAh! I just attach a cheap glow connector to the pack, strap the pack to the box, and I'm set for months. (Note: to charge this pack, you'll need a single-cell charger.)



Here's what you need to make a starter box: a 12V gell-cell battery (A), a 12V starter (B), a switch (C) and a starter wheel (D).

AERO-CAR TECHNOLOGY



Super Speed Gear & Diff Lube

Aero-Car Technology introduces a new lubricant for use in gearboxes and ball differentials. Developed for the aerospace industry, this lube can reduce amp draw by as much as 28 percent and increase ball-diff life by 250 percent. It's non-toxic and environmentally safe, and it won't harm plastic, nylon, or polycarbonate.

Part no. AC 1001

ONLY \$5.99!

For more information, contact:

Aero-Car Technology Inc.

P.O. Box 336

Western Springs, IL 60558

(708) 246-9027

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- One Outdoor Track • Pulling Pit
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WALT'S HOBBY

(315) 453-2291

2 Dwight Park Drive, Syracuse, NY 13209

Surplus R/C Parts

800 Stock Motors

(Race Prep, Green Endbell) 6.00 ea.

600 N1200 SCR Batteries 2.00 ea.

225 KR-1700 SCE Batteries 2.50 ea.

Add 75¢ per motor for shipping & handling.
Add 25¢ per battery for shipping & handling.

Prices good while supply lasts.
Minimum order, \$20.

Send certified check or money order.

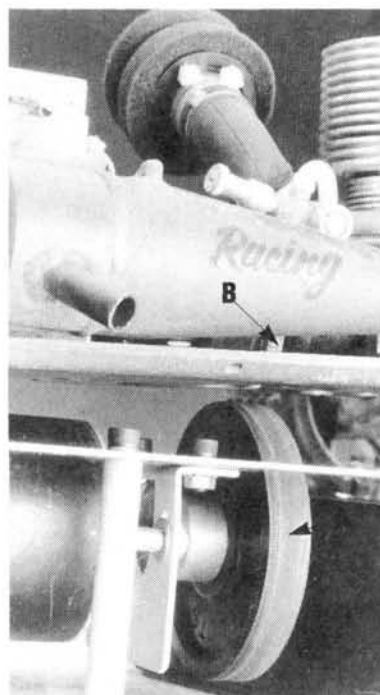
Pearce Hobbies

5715 W. Diamond K. St.

Tucson, AZ 85713-4470

(602) 883-1071

START ME UP!



As you press down on the car, the switch is triggered, to set off the starter wheel (A), which is aligned with a flywheel (B).

THE STARTER

Many starter boxes don't come with starters, but just about any starter will work as long as you mount it in the box securely. (Starter-boxes usually include the mounting hardware.) Because most starters are designed to work with airplanes, they're equipped with a thumb-operated switch that you can remove.

Rubber starter wheels are better than those made out of foam. (Foam tends to dry out and, eventually, chunks of it will fall off.) Sullivan* makes a great wheel and an aluminum mount that fit most starters. Just screw the mount into the motor shaft, and slip on the wheel. Use thread-locking compound to prevent the mount from loosening, and secure the wheel to the mount with a nylon strap or a pair of screws.

WHERE TO GET ONE

Several companies offer starter boxes. Tower Hobbies* sells

If you're a racer, there's no faster way to get your car back on the track than with a starter box.

one for the Burns cars, but it will work with other cars, too. OFNA* also offers one that will work with many cars. The starter box shown in the photos was sent to us by a Thai company called Upgrade. It's not available in the States yet, but the company is looking for an importer.

If you're a racer, there's no faster way to get your car back on the track than with a starter box. You'll soon appreciate its value. Good luck, and good racing!



I made a pack for my glow plugs using old SCR cells, and I attached a cheap glow connector to it. I'm set for months of charging!

*Here are the addresses of the companies mentioned in this article:

Sullivan Products, P.O. Box 5166, 1 N. Haven St., Baltimore, MD 21224.

Tower Hobbies, P.O. Box 9078, Champaign, IL 618246.

OFNA Racing Division, 18 Technology, Ste. 159, Irvine, CA 92718. ■

Track Directory

YOUR 1992 TRACK GUIDE

Track owners! To list your track in this directory, send us information on your facility that includes the type of track and its dimensions, on-site concessions/amenities, business hours, a contact person and a complete address and phone number to: "Track Directory," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897. We've listed as many clubs as space allows. Tune in next month for more Track Directory!

ALABAMA

Dixie R/C Speedway, Rt. 10, Box 210, Gadsden, AL 35901; Craig Reynolds, (205) 442-1059



"Lii" **TST R/C Raceway**, 32 St. N., Alabama City, AL 35904; (205) 547-0072



R/C Hi-Tech Raceway, 3303 Meridian St., Huntsville, AL 35911; Rick Chambers, (205) 539-1347



Satellite Hobbies, 2799 Rose Rd., Albertville, AL 35950; Troy or Jerry Smith, (205) 878-2526



ALASKA

McKinley Hobby & Raceway, 2300 McKinley Dr., Wasilla, AK 99654; (907) 376-9351



Southtown Hobby & Raceway, 12001 Industry Way #2, Anchorage, AK 99515; Bob or Vickie Peters, (907) 345-3131



ARIZONA

Economy One-Stop Raceway, 4000 S. 4 Ave., Yuma, AZ 85366; (602) 344-3514



Overmyer's Speedrome, P.O. Box 541, Bullhead City, AZ 86430; Sarge Overmyer, (602) 758-2463



R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85028; (602) 272-3165



Scale Racing Sports, 1120 N. Hayden Rd., Tempe, AZ 85281; Mike Dolan, (602) 829-9117



ARKANSAS

AERCC, Vimy Ridge Rd., Little Rock, AR; (501) 945-7037



Arkansas Int'l. Superspeedway, Rt. 4, Stokes Rd., Pine Bluff, AR 71602; (501) 247-1488



R-C Wheelz, 2630 Piko Ave., N. Little Rock, AR 72114; (501) 758-3330



CALIFORNIA

ARO Hobbies Raceway, 24275 Sunny-mead, Moreno Valley, CA 92553; George or Mike Killeen, (714) 924-3240



Bob & Jim's R/C World, 3485 University Ave., Riverside, CA 92501; (714) 684-6314



Brake-a-way Raceway, 3179 Hamner Ave., Norco, CA 91760; Debbie Burrie, (714) 736-6063



California Auto Racers (CAR), 96 San Tomas Aquino Rd., Campbell, CA 95008; (408) 749-9751



City Speedway, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633



D&D Raceway, 290 S. First St., Turlock, CA 95380; Dave Miller, (209) 667-0970



Desert R/C Raceway, 39360 3rd St. E., Ste. 305, Palmdale, CA 93550; (805) 272-1835



Fast Eddie's R/C Raceway, 3261 Edward Ave., Santa Clara, CA 95054; Eddie Aflague, (408) 986-8256



Fast Lane, 25845 San Fernando Rd., #21, Saugus, CA 91350; (805) 255-2404



Frogtown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



Hobbycrafters Raceway, 323 Five Cities Dr., Pismo Beach, CA 93449; (805) 773-6765



Hobbytown USA Raceway, 4006 Foothills Blvd., Ste. 101, Roseville, CA 95678; Mike Galloway, (916) 773-5062



Jackman's R/C Raceway, 1616 N. Beale Rd., Marysville, CA 95901; Bonnie or Harry Jackman, (916) 741-3744



K&M R/C Raceway, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899



Lindsey's R/C Raceway, P.O. Box 443, Doyle, CA 96109; (916) 827-2457



Lucerne Valley R/C Raceway, P.O. Box 2047 Lucerne Valley, CA 92356; Frank Rodrigue, (619) 248-7305



M'n'M Hobbies, 710 E. Parkridge, Ste. 102-106, Corona, CA 91719; Richard Trujillo, (714) 272-3545



One-Stop Raceway, 3782 Cerritos Ave., Los Alamitos, CA 90720; (213) 493-7597



Outlaw R/C Hobbies, 7920 Webster, San Bernardino-Highland, CA 92346; Rick James or Paul Nadeau, (714) 864-1770



Paso Robles R/C, P.O. Box 3795 (3980 Linne Rd.), Paso Robles, CA 93447; (805) 237-0624



The Race Place, 13564 E. Imperial Hwy. Unit G, Santa Fe Springs, CA 90670; (213) 926-7711



Radio-Controlled Hobbies, 2011 Placentia Ave., Costa Mesa, CA 92630; (714) 631-1555



R/C City Raceway & Hobbies, 1453 N. Milpitas Blvd., Milpitas, CA 95035; Tom & Bonnie Grader, (408) 262-3188



R/C Racing Center, 9842 Channel Rd., Lakeside, CA 92040; (619) 443-2270



R/C Sports, 1009 Alamo Dr., Vacaville, CA 95688; (707) 446-5555



R/C World, 5759 E. Fountain Way, Fresno, CA 93727; Brian Gaynor, (209) 348-9409



Robin's Racing World, 1844 W. Glenoaks, Glendale, CA 91201; (818) 240-2093



Roy's Raceway, 368 E. 11th St., Tracy, CA 95316; (209) 836-3513



San Diego R/C Car Club, P.O. Box 232456, San Diego, CA 92193; (619) 560-0089



Square Roundhouse R/C Speedway, 1468 Lander Ave., Turlock, CA 95380; (209) 668-4454



SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



Trains, Planes, Automobiles, 1260 Oddstad, Redwood City, CA 94062; (415) 365-7500



Tyler's RC/RD Racing Center, 6865 Flanders #D, San Diego, CA 92121; (619) 597-3072



White Mountain R/C Raceway, 174 West Line, Bishop, CA 93514; (619) 872-1599



Yorba Linda R/C Speedway, 3780 Prospect #B, Yorba Linda, CA 92686; David Landier, (714) 572-2175



COLORADO

Action R/C Raceway, 4939 N. Broadway #57, Boulder, CO 80304; (303) 440-0330



Colorado R/C Speedway, 6520 Wadsworth Blvd. #130, Arvada, CO 80003; (303) 425-1718



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Automatic lap-counting
- Food available

Track Directory

Edora Park R/C Speedway, Edora Park, Ft. Collins, CO 80524; (303) 482-0197



Hot Lap Hobbies & Raceway, 4206 Wadsworth, Wheat Ridge, CO 80034; Phil Cotter, (302) 420-3051



MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151



R/C World & Track, 2788 S. Federal Blvd., Denver, CO 80236; (303) 789-0838



CONNECTICUT

Connecticut R/C Off-Roaders, Old Field School, Mona Terrace, Fairfield, CT 06430; Mike Belmonte (203) 661-0145



East Hartford R/C Speedway, 52 Village St., East Hartford, CT 06108; Bob Matulis, (203) 528-8566



High-Tech Raceway, 374 Enfield St., Enfield, CT 06082; (203) 745-8488



Hobby World Raceways, 161-6 Woodford Ave., Plainville, CT 06062; (203) 793-1111



K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501



R/C Raceways Inc., 1265 John Fitch Blvd., South Windsor, CT 06074; (203) 528-3661



R/C World/Sugar Hollow Speedway, 66 Sugar Hollow Rd., Danbury, CT 06810; (203) 748-2185



SCORA/Clayton's Off-Road Racing, 141A Middletown Ave., North Haven, CT 06473; Craig or Keith, (203) 234-CLAY



Wallingford Indoor Racing, 63 N. Cherry St., Wallingford, CT 06492; (203) 265-3939



DELAWARE

TNT Raceway, Alt. 13 South, Seaford, DE 19973; (302) 628-0520



FLORIDA

B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-2666



Barry's R/C Raceway, 2701 SW College Rd. #603, Ocala, FL 32674; Barry Lees, (904) 237-4400



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



Continental Racing, 5335 N. Military Trail, West Palm Beach, FL 33407; (409) 697-5167



Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Tom Allison, (305) 721-0344 or Rick Schwartz, (305) 344-1983



5-fifty-5 Raceway, County Rd. 555, Bartow, FL 33830; Chuck Nolke, (813) 324-7406



Ft. Lauderdale Speedway, Mills Pond Park, 2201 NW 9th Ave., Ft. Lauderdale, FL 33311; Jack Koons, (305) 424-6617



Greater Orlando Auto Racers, 960 Keller Rd., Altamonte Springs, FL 32779; Dave Mottin, (407) 293-7090



H&H Raceway, 4121 S. Tamiami Tr., Sarasota, FL 34231; (813) 922-7711



Hialeah Hobby Raceway, 4562 W. 12 Ave., Hialeah, FL 33015; (305) 826-3702



JARCAR Raceway, 7273 103rd St., Jacksonville, FL; Rob Kruse, (904) 272-6315



Lake Whipoorwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (904) 759-3993



Lou's R/C Hobbies & Raceway, 1512 SE Village Green Dr., Port St. Lucie, FL 34952; (407) 337-9000



M&M R/C Raceway, 16921 Waterline Rd., Bradenton, FL 34202; Mike Williams, (813) 747-2889



Ocean Side Raceway, 206 E. Eau Gallie Blvd., Indian Harbour Beach, FL 32937; Michael Kelly, (407) 779-0312



PBG R/C Motor Park, 4399 Lilac St., Palm Beach Gardens, FL 33410; (407) 624-9252



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Raceway Hobbies, 1115-J Enterprise Court, Holly Hill, FL 32117; (904) 258-7537



Ray's Track & Hobby, 4605 W. Cayuga St., Tampa, FL 33614; (813) 872-8662



Rental Raceway, 3655 S. Hopkins Ave., Titusville, FL 32780; (407) 383-0631



River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



St. Augustine R/C Speedway, 99 Masters Dr., St. Augustine, FL 32095; (904) 824-6357



South Dade Speedway, 25520 1/2 SW 141 Ave., Princeton, FL 33032; John Cocker, (305) 388-3688



Space Coast Raceway, 563 Barton Blvd., #17, Rockledge, FL 32955; Bill Pinch, (405) 631-4373



Sun Valley Speedway, Palmer Blvd., Sarasota, FL 34232; (813) 322-1200; (mailing address: Rt. 1, Box 443N, Myakka City, FL 34251)



West Coast R/C Club, Lake Park, 8607 May Cr., Tampa, FL 33614; (813) 932-3650



Wilbur Avenue Raceway, 1848 Wilbur Ave., Vero Beach, FL 32960; (407) 567-1200



GEORGIA

Case R/C Raceway, P.O. Box 1061, Trenton, GA 30752; (404) 657-6789



Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



Georgia Hobby Center, 112 Kenwood Rd., Fayetteville, GA 30214; (404) 460-1753



Good Life City Raceway, 6606 Newton Rd., Albany, GA 31707; (912) 888-2515



Lake Mayer Raceway, 1 Melinda, Savannah, GA 31460; Phil Hurd, (912) 355-6033



Peach Bowl R/C Speedway, 2035 Westside Ct., Snellville, GA 30278; (404) 985-1448



The Racer's Edge, 1530 Hwy. 19 North, Thomaston, GA 30286; Mark or Roger Walls, (404) 648-6534



Sandy Cross Speedway, Rt. 1, Box 1073, Royston, GA 30662; Morris Phillips or Wayne Fowler, (404) 245-9573



Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; (404) 991-2225



HAWAII

Team PRC Racing Club, Pahoia Government Rd., Pahoia, HI 96778; Charlie Kawamoto, (808) 965-8216



IDAHO

Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



ILLINOIS

Adam's Blast Track, RR 1, Box 370, Ashmore, IL 61912; John Deffenbaugh, (217) 349-8447



Ameri-Trac, R3, Box 242, Mattoon, IL 61938; (217) 234-8707



Badlands II, 320 W. Jackson St., Vandalia, IL 62471; (618) 283-2913



BARR, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



Central R/C Raceway, RR 2, Box 51-A, Carlinville, IL 62626; Tim Stewart, (217) 854-9718 or Don Rice, (217) 854-3785



Eagle Speedway, 303 N. Plum, P.O. Box 774, Pontiac, IL 61764; Joe or Vickie Bachman, (815) 842-1738



Ebbtide Hobbies & Raceway, 865 N. Main St., Antioch, IL 60002; Jim Schaefer, (708) 395-8433



Hobby Town Raceway, 4915 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



JC Hobbies/Metro Motor Speedway, Metropolitan Airport, Metropolis, IL 62960; (618) 524-9979



JMP Raceway, 952 Harrison Ave., Wood River, IL 62095; (618) 258-0297 or -0282



Leisure Hours Hobbies, 2872 Plainfield Rd., Joliet, IL 60435; (815) 439-1477



Lisle Community Park Raceway, 1825 Short St., Lisle, IL 60532; Jim Bernicky, (708) 416-6944



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61111; (815) 282-1311



Magnum R/C Speedway, RR #2, Box 399, Danville, IL 61832; Terry & Nancy Dines, (217) 446-2472



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



Midwest Hobby Trax, 114 Kirkland Cr., Unit A, Oswego, IL 60543; Duane Pierson or John Koonce, (708) 978-RACE



Monroe R/C Raceway, 26049 Ridgeland Ave., Monroeville, IL 60449; (708) 534-2422



Precision Speedway, 3919 17 St., East Moline, IL 61244; Dan Kennedy, (309) 796-2226



Radio Active Raceways, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim or Lenny, (708) 759-7557



R/C Speed Zone, 1400 E. Lafayette, Bloomington, IL 61701; (309) 662-RACE



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Rick's R/C Raceway, 122 W. 12th St., Streator, IL 61364; Rick Wallace, (815) 673-1870



Rockford Scale Raceway, 6400 N. 2nd St., Loves Park, IL 61111; Sam Stroud, (815) 765-2970



Rockford Scale Raceway, 6900 N. 2nd St., Machesney Park, IL 61111; (815) 765-2970



SIRCAR Raceway, 1200 North Marion, Carbondale, IL 62901; (618) 549-5885



Slot Wing Hobbies Race Place, 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Smithton Community Park, P.O. Box 8152, Belleville, IL 62221; (618) 236-7569



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



Thunderroad Speedway, 4 E. Division St., Coal City, IL 60416; Al Cooley, (815) 634-8184



Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; (815) 332-4516



INDIANA

BJ's Riverside Raceway, 265 S. Clay St., Jasper, IN 47546; Joe Lorey, (812) 482-3484



Blaze'n Race'n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 867-1324



Boone County R/C Track, 1300 E. 100 S. Rd., Lebanon, IN 46052; Jerri Moss, (317) 293-2225



CC Hobby & Speedway, RR 1, Box 68, Francesville, IN 47946; (219) 567-2447



Classic Hobbies, 420 E. Commercial, Lowell, IN 46356; David Scheffler, (219) 696-0649



County Line R/C, 2333 W. State Rd. 38, Sheridan, IN 46069; Greg Welch, (317) 758-6393



Gonzo Raceway, 418 Roberts Rd., Chesterton, IN 46304; (219) 980-8409



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



Hobby World Raceway & Hobbies, 1508 N. Harlan, Evansville, IN 47711; Jeff Wassman, (812) 421-1100



K&L Hobbies, 7 Raceway, 2751 N. State Rd. 39, La Porte, IN 46350; (219) 324-0353



Master Hobbies, 8501 Bash Rd., Indianapolis, IN 46250; Tim or Dan, (317) 576-1961



Mooreville R/C Hobby, 7 Moore St., Mooreville, IN 46158; (317) 831-8877



Mooreville R/C Hobby, 9201 S. State Rd. 67, Camby, IN 46113; (317) 831-8877



PITT, 1244E 700N, Ossian, IN 46777; (219) 622-4591



Raceway Park, 919 E. McKinley, Mishawaka, IN 46545; Bob Bean, (219) 256-1020



Radio Car Craft, 1925 S. Curry Pike, Bloomington, IN 47403; (812) 332-3245



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Runway Hobbies Raceway, 5342 Elmwood, Ste. J, Indianapolis, IN 46203; Randy Hyatt, (317) 784-2421



IOWA

Kodiak Race Track, Box 78, Okoboji, IA 51355; Brad or Dave, (712) 332-7982



Mr. Car Raceway, Central Iowa Fairgrounds, Marshalltown, IA 50158; (515) 483-2234



North Park R/C Speedway, 805 S. Jerome, Algona, IA 50511; (515) 295-9352



Plymouth County R/C Speedway, 4th Ave. NE (Plymouth County Fairgrounds), LeMars, IA 51031; (712) 546-8788 or 546-9522



Power House Racing, 1200 S. Division St., Creston, IA 50801; (515) 782-4582 or 782-4174



River City R/C Speedway, 317 2nd NW, Mason City, IA 50401; Leonard Johnson, (515) 423-7333



Rotunda Raceway, 101 Bass, RR 1, Box 155A, Storm Lake, IA 50588; (712) 732-4555



Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Al Reck (712) 754-2604 (day) or 754-3613 (night)



Southwest Iowa R/C Raceway, Kelly Park, Red Oak, IA 51566; (712) 623-5513



Southwest Iowa R/C Raceway, Montgomery County Fairgrounds, Red Oak, IA 51566; (712) 623-5513



Team Johnson Speedway, Jct. Hwy. 34 & 406, West Burlington, IA 52655; (319) 753-0753



KANSAS

ACE Raceway, 325 Commercial, Emporia, KS 66801; Luke Amend, (316) 343-1933



Chad's R/C World & Raceway, 217 Brownie Ave., P.O. Box 76, Scranton, KS 66537; (913) 793-2313



Ebersole R/C Superspeedway, 11417 W. Hwy. 54, Wichita, KS 67209; Len Ebersole, (316) 722-8888



Pittsburg International Mini Speedway, 511 1/2 N. Locust, Pittsburg, KS 66762; (316) 232-1973



R/C Superdome & TQ Pro Shop, 14 E. Ave. A, Hutchinson, KS 67501; (316) 665-6633



Shawnee Hobby & R/C Raceway, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Rugh, (913) 384-3211



KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE



East Kentucky Hobby Raceway, Hwy. 15 Garner Mt., Isom, KY 41824; (606) 633-8567




KEY TO SYMBOLS


- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Automatic lap-counting
- Food available


Track Directory

Fast Lane Hobbies, 6132 Scottsville Rd., Bowling Green, KY 42104; (502) 782-2419



Hobby Center Inc., 2106 Triplett St., Owensboro, KY 42303; Bobby Howell, (502) 683-7611


Hobbys Plus, 819 Main St., Hazard, KY 41701; Joe Mavaro, (606) 436-3175



The Lexington Autodrome Raceway, 2753 Richmond Rd., Lexington, KY 40509; (606) 269-7794



Remote-Control Hobby Shop/Raceways, Rt. 8, Box 211, Mayfield, KY 42066; (502) 247-4715



River Cities Raceworld, 1104 Powell Ln., Flatwoods, KY 41139; (606) 836-CARS



West Kentucky R/C Cars, 45 Hawkins Loop, Symsonia, KY 42082; (502) 851-3534


LOUISIANA

Acadiana R/C Hobbies & Raceway, 120 Toledo Dr., Lafayette, LA 70506; (318) 235-5825



Cajun R/C Raceway, Rt. 2, Box 288 Hwy. 343, Church Point, LA 70525; (318) 873-3855


Hobby Shop Track, 110A Darbonne, Sulphur, LA 70663; (318) 527-9129


Oakdale Raceway, 1259 Hwy. 165 S., Oakdale, LA 71463; M.L. Jeziorski, (318) 335-3532



MAINE

Central Maine R/C Speedway, 18 Lithgow St., Winslow, ME, 04901; David Prescott, (207) 877-2232



Rocket R/C Hobbies, Annabessacook Rd., Winthrop, ME 04364; (207) 377-6910


Sanford Speedway, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



Team Terminator Off-Road Track, c/o Hobbies Plus, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



The Racers' Club, 85 Hubbard Rd., Berwick, ME 03901; (207) 698-5337



MARYLAND

ABC Raceway, 2825 Ocean Gateway, Cambridge, MD 21613; (301) 228-4291


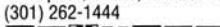
Doug's Hobby Shop Raceway, Rt. 301N, Box 32B, Waldorf, MD 20601; (301) 843-7774



40 Speedway, 933 Pulaski Hwy., Havre de Grace, MD 21078; Doug, (301) 538-3135


Friendship Off-Road Racers, 1531 Florida Ave., Severn, MD 21144; (301) 551-3050


GPA Speedway, 3498 Crain Hwy., Bowie, MD 20715; George Cole, (301) 805-9004



Off-Road Headquarters Indoor Raceway, 5640 K Sunnyside Ave., Beltsville, MD 20705; (301) 474-1246


Radio Control Cars, Inc., 13600-A Annapolis, Bowie, MD 20715; Paul Fauth, (301) 262-1444



Suzie Goose Hobbies, 718 E. Gude Dr., Rockville, MD 20850; (301) 279-2966



MASSACHUSETTS


Archer's Lane R/C Raceway, 11B Washington St. (Rt. 1), S. Attleboro, MA 02730; (508) 399-6762



Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244


CKS Raceway, 46 Wilbraham St., Palmer, MA 01069; (413) 283-2260


Megadrome Raceway, N. Adams Plaza, Rt. 8, North Adams, MA 01247; (413) 743-7223


Mike's Speedway, Rt. 9, Mt. Farms Mall, Hadley, MA 01035


Naytrix Raceway, Holmes Rd., Pittsfield, MA 01201; Rick Welch or Nate Zuckerman (413) 443-2488 or 443-9886


R/C Hobbies & Speedway, 1311 Purchase St., New Bedford, MA 02740; (508) 991-5040



West St. Hobbies, 114C Main St., Medway, MA 02053; (508) 533-1231


MICHIGAN

Baja Bayou Off-Road Raceway, 5313 W 22 Mile Rd., Tustin, MI 49688; (616) 829-3447


Bill's Raceway, 7126 Pardee, Taylor, MI 48180; Bill Rollins, (313) 291-6238


Can-Am Hobbies Speedway Park, 1148 Gratiot, Marysville, MI 48040; (313) 364-3338


Cereal City R/C Off-Roaders, 2000 E. Columbia Ave., Battle Creek, MI 49015; (616) 963-2506


Dirt Slingers Raceway, 2460 Edwards, 2460 S. M139, Benton Harbor, MI 49022; Tom Edwards, (616) 927-1431



Fun Tyme High Banked Oval, Fun Tyme Adventure Park, 6295 E. Saginaw Hwy., Grand Ledge, MI 48837; (517) 655-5503


Jonimo Hobby & Raceway, 27788-90 Joy Rd., Livonia, MI; Steven Ollar, (313) 422-1830


Larry's Performance R/C's, 3430 Highland Rd., Waterford, MI 48328; Larry Rossi, (313) 683-5529



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



Mason County R/C Car Track, West Shore Community College, (611 N. Washington Ave., Ludington, MI 49431) Scottsville, MI 49454; (616) 843-8553 or 843-4837


Mikey's Raceway, 7 North St., Yale, MI 48097; Mike Huber, (313) 387-4308


More R/C Club, 33538 23 Mile Rd., Chesterfield Township, MI 48047; (313) 773-5918 (Tom Kelly) or 749-9774 (Joe)

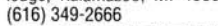

NMRCC Raceway, 110 N. Otsego, Gaylord, MI 49735; (517) 732-3963


Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; Frank, (517) 773-5711



R&L Hobbies, 10334 Portage Rd., Portage, MI 49002; (616) 323-3686


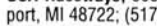
R.G. Enterprises, 600 N. Lafayette, Greenville, MI 48838; (616) 754-4919


Rider's Superspeedway, 42040 Koppernick, Ste. 400, Canton, MI 48187; Brent Martin, (313) 451-5599



Rider's Superspeedway, 4415 S. Westledge, Kalamazoo, MI 49008; Ken Penn (616) 349-2666


Thumb Raceway, 3441 S. Main St., Marlette, MI 48453; (517) 777-7054


USA Raceways, 6083 Dixie Hwy., Bridgeport, MI 48722; (517) 777-7054



Village Hobbies-n-Crafts, 17824 N. Maple Island, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



MINNESOTA

ABC Raceway, 120 2nd St. NW, Pipestone, MN 56164; Ross Lange, (507) 825-5065


Greater Minnesota Racine Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Mac's Models, 80 E. Little Canada Rd., Little Canada, MN 55117; Dean Nelson, (612) 482-7796


Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365


The PBR Off-Road Rally, 721 Cedar Ave., Hector, MN 55342; Philip Zempel, (812) 848-2129


Range Racing World, Inc., 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423


Range Racing World, Inc., Sherwood Forest Campgrounds, Gilbert, MN 55741; Bill O'Neal, (218) 744-4423


Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 722-6248


MISSISSIPPI

Norm's R/C Hobbies, 310 E. Beach Blvd., Long Beach, MS 39560; (601) 863-0524



Precision Hobbies, 240 Eisenhower Dr., Biloxi, MS 39531; (601) 388-6346


Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST


MISSOURI

Doug's Hobbies, 5221 Veil of Tears, Jefferson City, MO 65109; (314) 893-5861


Gateway R/C Track & Hobbies, 255 Marshal Rd., P.O. Box 345, Valley Park, MO 63088; (314) 225-5844


Harrisonville Hobby Shop & Raceway, 2301 S. Commercial, Harrisonville, MO 64701; Richard Taylor, (816) 887-3055


Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Outback Speedway & Hobby, 2810 Sutton Blvd., Maplewood, MO 63143; (314) 644-3383


R + Hobby, 590 Jungermann Rd., St. Peters, MO 63376; (314) 928-9838


MONTANA

Bozeman R/C Powerhouse Track, west side of the Main Mall, Bozeman, MT 59715; (406) 586-6461


Garden City Raceway, 6725 Hwy. 10 W., Missoula, MT 59802; (406) 721-5405


Magic City R/C Raceway, 14th St. W. & Central Ave., Billings, MT 59101; (406) 259-9004


NEBRASKA

Hobby Town USA, 3404 W. 13th St., Grand Island, NE 68801; Ed Conroy, (308) 382-3451


Over the Wall Gang, Higiroadbee Speedway, 401 Market Pl., Norfolk, NE 68701; Matt Moeller, (402) 379-0879


Riverside R/C Raceway, Hwy. 77 S., Fremont, NE 68025; Mike Katz, (402) 727-6835


The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414


NEVADA

Little City Hobbies Raceway, 640 Kuenzki, Reno, NV 89503; Gregg Allen, (702) 786-3611


NEW HAMPSHIRE

4-K Racing, 100 Warwick Rd., Winchester, NH 03470; (603) 239-6207


C.T. Hobbies R/C Raceway, 49 Eaton Rd., Auburn, NH 03032; (603) 483-2274


Hobbies Plus R/C Raceway, 14 Celina Ave., Nashua, NH 03063; (603) 882-9200


Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549


R&B Racing, Lily Pond Rd., Gifford, NH 03246; Louie, (603) 524-2909 or Bud (603) 524-1893


NEW JERSEY


Action Raceway & Hobby Center, Rt. 295 & Harmony Rd., Gibbstown, NJ 08027; (609) 423-8933


Dave Bicknell Memorial Raceway, P.O. Box 914, Absecon, NJ 08201; Rob Caruso, (609) 748-8291


Glassboro's Grand Oval Speedway, 167 S. Delsea Dr., Glassboro, NJ 08028; (609) 863-1551


Jackson R/C Racing, Marshall Ave., Jackson, NJ 08527; (908) 905-1593



LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122


Pixley International Speedway, 763 Peters Dr., P.O. Box 189, Martinsville, NJ 08836; Richard Toole, (908) 560-0399


The Race Place, Rt. 33 & 34, Farmingdale, NJ 07727; (908) 938-5215


Radical Raceway & Hobbies, 100 Rt. 17S, Lodi, NJ 07644; (201) 843-6996



Ricky G's Raceway, 2208A Hamilton Blvd., South Plainfield, NJ 07080; (908) 753-1518


Tri-Oval Speedway & R/C Center, 296 S. Main St., Phillipsburg, NJ 08865; (908) 454-2223


Truck Challenge, 1162 Rt. 202-206 N., Bridgewater, NJ 08807; Michael Gill, (908) 658-9616


Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717


NEW MEXICO

The Pit, Las Cruces Hobby Raceway, 1996-A S. Valley Dr., Las Cruces, NM 88001; (505) 524-8530



Racers Inn, 4300 Rankin Ln. NE, Albuquerque, NM 87107; (505) 345-5988


TRC Race Park, 1303 E. 8th St., Truth or Consequences, NM 87901; Gary Whitehead, (505) 894-3211


NEW YORK

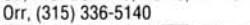
A&D's FasTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065


A&S Race Center & Hobbies, 120 Cayuga St., Canalview Mall, Fulton, NY 13069; (315) 598-2772


Bellmore Raceway, 2479 Charles Ct., Bellmore, NY 11710; (516) 783-3456 or 783-0105


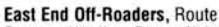
Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224


Cars R/C & Guitars, 4360 Seneca St., West Seneca, NY 14224; (716) 674-0905


Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140


Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted House, (315) 628-5065


Dirt Track, 17 Fairway Dr., Manorville, NY 11949; Billy Wroblewski (516) 878-0737


East End Off-Roaders, Route 25A at Gull's Square, Wading River, NY 11792; (516) 929-8844



Gamlen's R/C Motor Speedway, 8453 Rt. 11, P.O. Box 1430, Cicero, NY 13039; Dave Wright, (315) 699-2991


GP Racing, 6785 Martin St., Rome, NY 13440; Greg Phillely, (315) 336-5140


Island Hobbies & Raceway, 410 Commack Rd., Deer Park, NY 11729; (516) 254-6229


Lakeside Raceway & Hobbies, 712 Willow Ave., Ithaca, NY 14850; (607) 272-0248



Latest Hobbies & Raceway, Rt. 25A, Wading River, NY 11792; (516) 929-8844


LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384


Maspeth Raceway, Rust St. & 57th Rd., Maspeth, NY 11378; (718) 894-0800


Norwood Hobbies Raceway, 2-4 S. Main St., Norwood, NY 13668; Tom Jarvis, (315) 353-6621


Performance Plus R/C Speedway, The Hobby House, 114 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772


Queens Off-Roaders, 42-12 13th St., Long Island City, NY 11101; (718) 392-5766


Race O Rama, 44 Sharon Ave., Plattsburgh, NY 12901; James Varno, (518) 562-5442 or 643-2678


KEY TO SYMBOLS

-  Indoor
-  Outdoor
-  Off-road
-  Oval
-  Dirt oval
-  Carpet
-  Concrete
-  Asphalt
-  On-site hobby shop
-  AC power
-  Automatic lap-counting
-  Food available

HOT TRACKS

Here's another in our "Hot Tracks" series of outstanding R/C racecourses. To see your favorite track featured here, send some sharp black-and-white photos and a description of its delights (approximately 500 words) to: "Hot Tracks," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.



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houses three tracks: a concrete oval, an on-road course and a clay off-road course.

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The R/C Pro Shop and Raceway is open on Tuesday and Wednesday nights until 6:30 p.m. and Thursday until 9 p.m. for practice runs. Friday nights are reserved for 1/12- and 1/10-scale oval and on-road racing; Saturday nights are for 1/10-scale off-road racing.

For more information, contact Bill at (915) 563-3726, or stop by the R/C Pro Shop & Raceway, 12207 W. County Rd. #129, Odessa, TX 79765. ■

NISSAN SKYLINE

(Continued from page 115)

After about 4 or 5 minutes of pure satisfaction, the battery ran out of juice.

I was surprised by the traction that the rubber tires provided. Regardless of what I did, the Skyline wouldn't spin out. Its performance was stable and consistent during every maneuver. On the turns, it handled predictably and was always ready for more power.

I've been involved in R/C car racing for several years, and I've spent most of that time (and a lot of money) trying to be the best. The Skyline GT-R project taught me how to just *enjoy* this fantastic hobby. (Of course, I enjoy competing, but I often became too intent on winning rather than on having fun.)

The Skyline is a great-looking scale car that also happens to be a solid performer. With Tamiya's reputation for reliable, well-designed products, this car will surely become the local parking lot "king."

*Here are the addresses of the companies mentioned in this article:

MRC/Tamiya, 200 Carter Dr., Edison, NJ 08817.
KO Propo, distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Tekin Electronics, 970 Negocio, San Clemente, CA 92672.

New Wave Cells, Brooklyn Navy Yard, Bldg. 408, Brooklyn, NY 11205.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036.

NORRCA NATS

(Continued from page 94)

Press finally came across in 2nd, followed by Correa and Walrod. The three finishes were separated by less than 2 seconds.

1/10-SCALE DIRECT-DRIVE STOCK A-MAIN

This race was a Cinderella story. Hawkins had the TQ position, followed by Rau and Chris Verano. They smoked the field all weekend, and they looked pretty good. At

(Continued on page 146)

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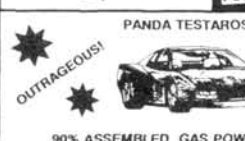
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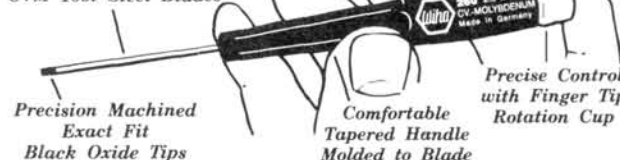
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NORRCA NATS

(Continued from page 145)

the start of the Main, they took off like scalded stock-motor cats, only to find that the laws of physics are real. Two (or more) bodies can't occupy the same space at the same time. Turn one...get the picture? Along came the last-place qualifier, C.J. Einspahr, who drove carefully around the mess at turn one and was gone! I mean, *nobody* came close to this guy for 4 minutes; they were all too busy trying to violate the laws of physics! Einspahr came away with an easy win, followed by Dennis Ariga and Hawkins.

1/12-SCALE MODIFIED A-MAIN

In this class, Berger was the man to beat. Imagine a guy who practices on the showroom floor of a local car dealership after hours. He clears out the cars, lays down a tight, twisting course on the carpet, and proceeds to run down all his batteries. All that practice paid off.

Berger led the pack from the start. He had Killam, Eric Vasutin, Billy Bowerman and Mace Horowitz on his tail with serious horsepower. Berger never missed a line, and he sliced near-record laps for the

first 1½ minutes. That was enough to put a huge gap between his car and the rest of the pack. From there on, it was cruise control in the "on" position.

Meanwhile, there was a good battle for second between Killam, Vasutin and Bowerman. Killam knows how to occupy space on a track, and he gave every challenger a taste of his ability. It forced Bowerman to eat a corner, and later, it forced Horowitz to nail a dot. Killam took 2nd; Vasutin finished a little more than a second behind him; and Bowerman

(Continued on page 160)

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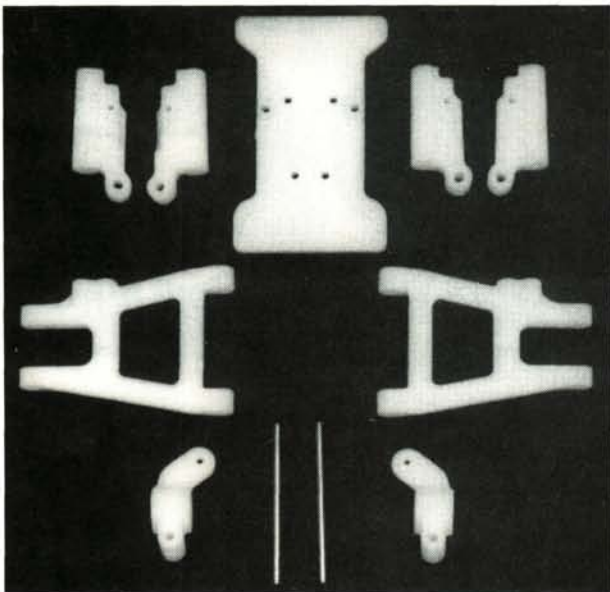
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NORRCA NATS

(Continued from page 146)

crossed the line right on Vasutin's tail. Although he had laid down a 35-lap qualifying run, Berger needed only 33 laps for the win.

NORRCA thanks all the sponsors who made this event a success: Andy Jacobsen of Andy's R/C Products; Bob Novak and Tyree Phillips of Novak Electronics; Dan Moynihan of Dan's R/C Stuff; Bill Wishon of B&B Software; Ted Holt of Scat Racing Products; Kevin Orton of Tekin Electronics; Bud Bartos of Bud's Racing Products; Kevin Winans of CKW Tires; Roger Curtis of Team Associated; and Gary McAllister of McAllister Racing.

The 1991 NORRCA On-Road Nationals were well-run and competitive. Kudos to J. R. Sitman! Get ready for 1992...the NORRCA Nats will be killer! ■

NITRO NEWS

(Continued from page 106)

TOE ADJUSTMENTS

Toe-in and toe-out refer to the angle set between the paths of the left and right wheels. Zero toe means both the wheels (the fronts or the rears) point in exactly the same direction.

- Toe-in means the front of the wheels point inward, toward each other.
- Toe-out means the front of the wheels point outward, away from each other. For most cars, slight front and rear toe-in will increase straight-line stability, but on 4WD

(Continued on page 163)

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NITRO NEWS

(Continued from page 160)

cars, toe-out is sometimes used to improve cornering. Too much toe-in or toe-out causes the tires to drag ("tire scrub"), and this reduces top speed. Every track poses its own set of problems for racers.

Suspension adjustments allow racers to tune their cars for specific tracks. Each change is a compromise that involves several variables. Correctly balancing traction, steering response and weight can make the difference between reaching the winners' circle and returning to the spectators' seats. First, concentrate on improving your car's performance on the most difficult part of the track, and deal with smaller problems later. Understand how your suspension and chassis work with the track, but remember that there's no better way to spend your time than practicing.

Next time, I'll describe several common handling problems and offer solutions. Until then, it might be a good idea to read this article again to avoid "suspension shock."

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LETTERS

(Continued from page 103)

GOOF OF THE MONTH

It was a Thursday night, which is when the 1/10-scale on-road class is run at our local track. The subject of this "goof" is Chuck Heidemann, who's the class points leader, so he knows a thing or two about what he's doing. On this night, however, he was a little anxious; there were a couple of new racers that he wanted to beat.

He had run well in his first race, but one of the newcomers had turned more laps in another heat and would face him in the next run. Looking for an extra boost, Heidemann naturally turned to that stock-motor "pick-me-upper"—comm drops. The cars lined up and the starting signal was given, but something was wrong! Not only did his car lack the extra get-up-and-go, but it had no "go" at all!

Slower than a turtle, he made a few laps before he realized it was no use. He picked up his car and returned to the pits. Other racers looked on, saying such things as, "Burned it up, huh?" or, "Must have hung a brush." But he alone knew that there wasn't a problem with the motor. In his haste to apply the comm drops, he had picked up the wrong bottle! That night, Chuck Heidemann picked up a new nickname. The next time you see him, just say "Hello, Superglue!"

ROGER DELOACH
Duluth, MN

IN THE DUMPS?

I have a question about the 2A automobile 12-bulb discharger—the "Dumpster"—that Steve Pond wrote about in the *Radio Control Racer* issue (November '91). Can you use it with a matched 1400mAh 7-cell pack?

JASON HOPKINS
Citrus Heights, CA

(Continued on page 176)

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LETTERS

(Continued from page 166)

You should dump your pack at about the same rate as it would be depleted during a race. It's fine to use the 12-bulb "Dumpster" for most 1/10-scale applications, but for high-speed oval or drag racing, you may want add two bulbs. LA

RUDE RACERS?

Several months ago, I went to a local track for the first time. The people there looked at me as if I were weird, and this ticked me off. (They only did this because I'm 12.) Some of them even laughed at my friends. I think this kind of behavior discourages young racers. If we want this hobby to grow, we have to encourage newcomers.

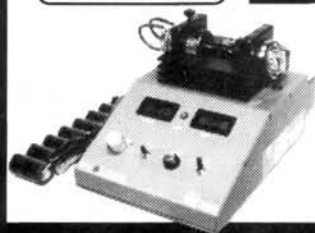
ALI KHANI
Torrance, CA

We agree, Ali. I hope you can show up these buffoons by setting a better example, but it sounds as though they're beyond help.
LA

(Continued on page 190)



PRO DYNO



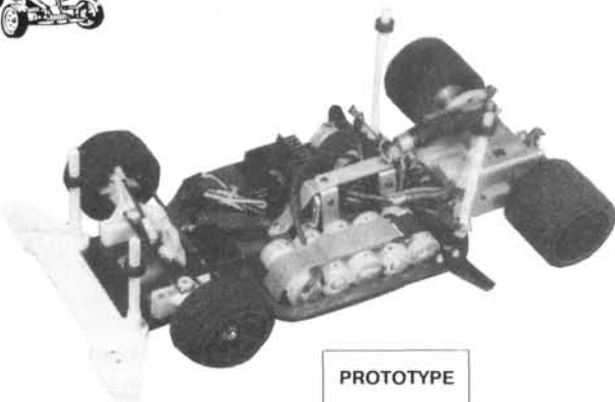
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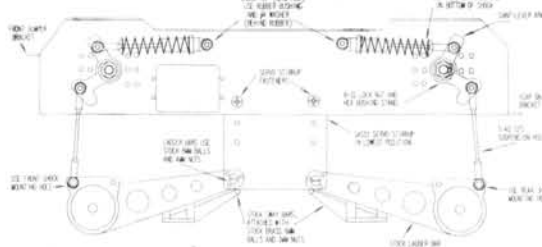
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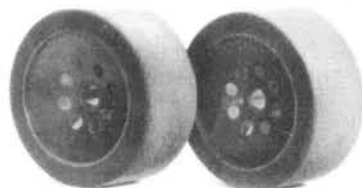
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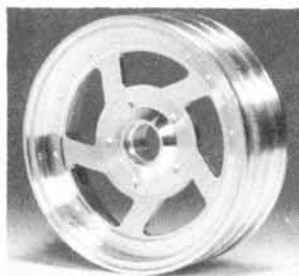
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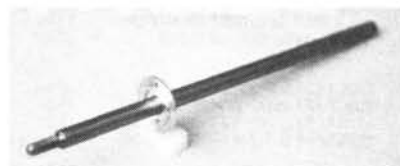
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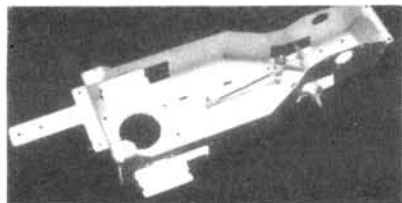
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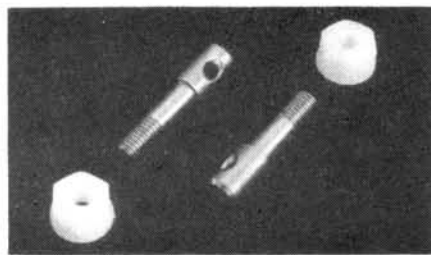
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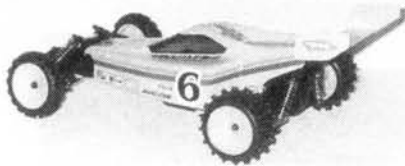
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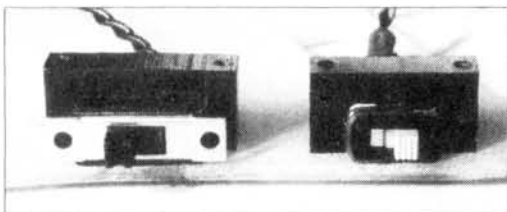
Hobbico Command servos feature surface-mount technology, an indirect-drive potentiometer, Oilite bushings or ball bearings and high torque—all at an affordable price. They're available in five popular styles: mini—for electric helicopters and small aircraft; standard—for on-road, off-road cars and trucks; standard—for all airplanes and helicopters with Oilite bearings; deluxe—for aircraft and helicopters with ball bearings; large (1/4 scale)—with 130 ounces of torque and ball bearings. All Command servos come with a one-year warranty.

Price: \$17.95 to \$47.95

For more information, contact Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here doesn't constitute endorsement by **Radio Control Car Action**, nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to say you read about it in **Radio Control Car Action**.

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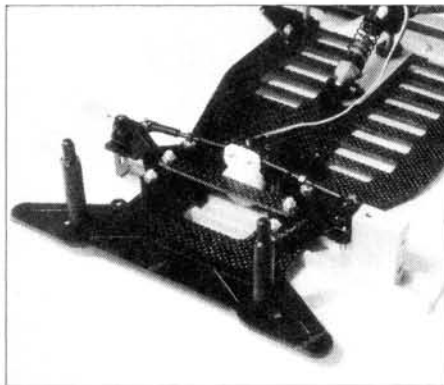


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LETTERS

(Continued from page 176)

CHASSIS CHOICES

Your magazine is *the best!* It contains valuable information that has helped me to become a better racer. *Thanks!*

What are the technical differences between fiberglass and graphite chassis, e.g., weight savings, strength, etc.? Also, are you planning to do an in-depth report on the 1/10-scale Twister Cyclone on-road racer?

SHAWN MISSIO
Marlowe, KY

Both types of chassis have advantages and disadvantages. Fiberglass chassis are light and relatively inexpensive, but they're somewhat flexible. Graphite is even lighter and stiffer, but it's much more expensive. The best chassis are stiff enough not to flex when the car hits a bump, but light enough to keep the car's weight down. Dual-plane fiberglass chassis work well on off-road cars, but for on-road or oval cars, single-plane graphite chassis are the only way to go.

Jim Shepka reviewed the Twister Cyclone in the April '91 issue. AS

THE INSIDE LINE

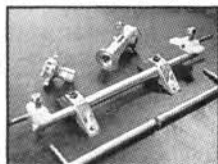
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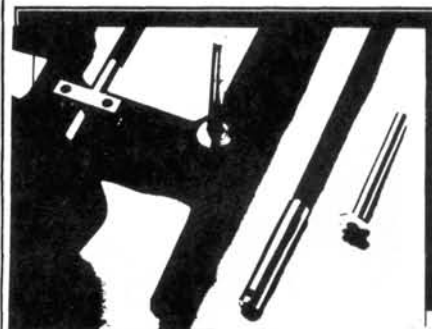
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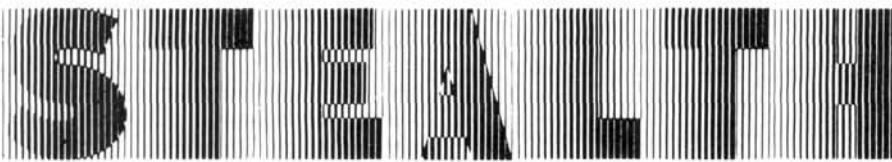
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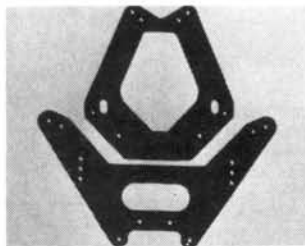
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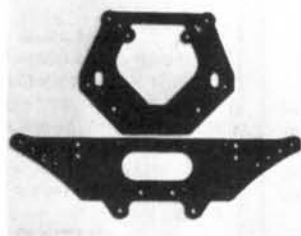
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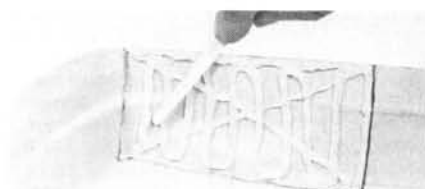
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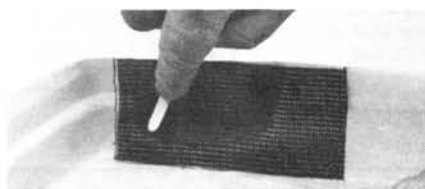
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